DYSLEXIA ASSOCIATION

DAS
DAS

OF SINGAPORE

Asia Pacific Journal of Developmental Differences

Contents

Editorial Comment

Angela Fawcett, Editor in Chief

It is a very great pleasure to provide my comments for the January issue of Asia Pacific Journal of Developmental Differences (APJDD), as Editor in Chief of the Journal for the last 11 years and moving forward. I am proud to confirm that the APJDD has gone from strength to strength during these years. This issue has proved to be a particularly impressive one, with 8 articles presented here, by contrast with the standard 7 usually presented in this journal. One of the overarching themes of this issue are the impact of technology for teachers and learners across the age range, particularly in relation to higher order skills, a key area as we move into 2025. In fact, the majority of this issue focuses on adolescents and adults and the challenges they face, in terms of both teachers and learners, and changes in the format of support needed.

In our first issue of 2025, it is a pleasure to introduce the article "Vocabulary Instruction, Reading Comprehension, and Writing - Examining the effectiveness of an online intervention literacy programme for secondary students with dyslexia" by Melcher Tan and Serena Abdullah from DAS. In a qualitative study, the authors evaluate the efficacy of computer intervention plus teachers questioning techniques, and how this approach enhances learning by observing student's engagement and response. This article draws on the synergy between online tools and teacher strategies in future development for Special Education. The second article from Dr Damaris Carlisle and Prof Jennifer George 'Bridging the Gap: 5 Minutes of Digital Inclusion Empowers Educators in Higher Education for Learner Success' draws on a similar theme, here again focussing on the role of the teacher, but this time in Higher Education in building strategies for their input into online intervention through regular short targeted sessions. This is particularly invaluable to upgrade the skills of teachers who are less familiar with online tools. Again the third article, by Rosalyn Wee and colleagues from DAS, "Effectiveness of support for speech-writing and presentation skills for students with learning differences: Teachers and students perspectives", evaluates the effectiveness of the iStudySmart™ programme for the transition between secondary and tertiary education. Results confirm the usefulness of this approach in self-directed learning, using a variety of online tools and diagnostic assessments.

The next article addresses 'Orthographic awareness and its relationship to Chinese word reading and spelling in young bilingual learners with Chinese reading difficulties in Singapore' from Kong Yun Rui and colleagues. In this major study, including 218 typically developing and 513 bilingual learners with difficulties in Chinese, the authors

highlight significant differences in both structural and functional orthographic awareness in reading and spelling for those with difficulties, throughout elementary school, with greater difficulty as participants move from grade 1-6, which needs to be addressed to improve literacy. This study has implications for remediation, emphasising the importance of providing structured support as soon as possible for Chinese language learners with difficulties.

Returning again to older students, the next article by Nur Ashabiena from DAS, entitled 'An exploration of the perspectives of students with dyslexia regarding the factors that affect their learning' the results of semi-structured interviews are presented with students aged 14-15. Three themes are identified: Factors helpful to learning; factors which are a barrier to learning, and factors with no effect on learning. The importance of a supportive environment for learning is emphasised in encouraging sound learning habits, and the need for both parents and teachers to provide ongoing support.

Following on from the enhanced interest in computer supported learning, the next article applies this approach with children taking the primary examination in Singapore at DAS, which determines their placement in secondary school. Preparation for this is highlighted in a qualitative study "Efficacy of teaching practices in online English comprehension lessons for learners with Specific Learning Differences (SpLD): A qualitative analysis" by Tuty Elfira and colleagues at DAS. This presents an analysis of lesson observation videos for two therapists, coupled with student worksheets and online learning tools, with data analysed within a novel framework, Engagement for Learning (EFL). The results highlight the interconnectedness of thought to facilitate cognitive engagement and critical thinking for these students with a questioning technique as an essential part of teacher support, with implications for self- evaluation for the therapists involved.

I hope you will agree that the issue so far has important implications for working with older children and those with difficulties who speak an alternate language. The final two articles in this issue address the impact of failure in dyslexia, for those who have not benefitted from the structured support provided here, namely prisoners who are incarcerated and suffer from dyslexia or other aspects of neurodiversity. The first article from Dr Christina White Prosser and Dr Roswita Dressler, "Integration of Assistive Technology in the Teaching of Incarcerated Students with Learning Challenges: One Instructor's Perspectives, identifies some of the issues in using technology in prison with limited access to many of the tools we take for granted. This article provides a case study of using the Reading Pen to facilitate learning for this group, allowing them to check words without constant access to the teaching therapist. The final article here, by Dr Neil Alexander-Passe, provides a substantive overview of the route from failure to criminality, "Dyslexia and Crime: the 'school-to-prison' pipeline and why it happens". This comprehensive article is lengthy and covers a great deal of ground, highlighting the importance of early screening and support, or later screening on arrest and provision of

support in court. This article is modified from the book "Dyslexia Neurodiversity and Crime", published in 2023, with a recent edition to the series "ADHD and crime", advocating for the importance of neurodiversity in leading participants into crime, and providing appropriate intervention and support for those struggling with basic literacy and attention.

We hope that you find the issue an interesting one. It is my pleasure to introduce to you here, for those who are not familiar with her work, Dr Eunice Tan, Head of the Special Education programme at S R Nathan School of Human Development, Singapore. Dr Eunice presented a fascinating contribution to last years' UNITE 2024 conference at DAS, which was much enjoyed by her audience. I am pleased to welcome her as the Guest Editor, for the second edition of APJDD in July 2025, Eunice enriches the range of neurodiversity in the APJDD to include autism and savants, and we look forward to working with her, and welcome her forthcoming contribution to this journal.

Angela J Fawcett

January 2025

Vocabulary Instruction, Reading Comprehension, and Writing - Examining the effectiveness of an online intervention literacy programme for secondary students with dyslexia

Melcher Tan[1] and Serena Abdullah[1*]

1.   *Dyslexia Association of Singapore*

Abstract

As students with dyslexia develop their foundational literacy skills in reading and spelling, it is also imperative to ensure that they are being supported in managing their advanced literacy challenges in reading comprehension and writing given that these difficulties tend to persist or increase over their educational journey. Therefore, recognising the higher level of expectation, the sophistication of skills in literacy that are essential for students to acquire as they transition to secondary schools and beyond as well as the limited access to specialist programmes targeting the higher-order literacy skills, the English Language and Literacy Division (ELL) at the Dyslexia Association of Singapore (DAS) developed the iReaCH™ programme. iReaCH™ focuses primarily on equipping students with the necessary reading comprehension skills and strategies through an intentional and conscious emphasis on vocabulary instruction, a vital cornerstone in language and literacy development. During the course of the study, the programme was delivered online. This paper highlights not only the teaching pedagogies and approaches of iReaCH™ but also evaluates the relevance and effectiveness of the programme through the administration of formative and summative assessments, surveys and testimonials as well as an analysis of students' writing scripts. Overall, the results showed positive gains in the application of vocabulary knowledge, comprehension skills and writing techniques taught to secondary school students, with moderate to large effect sizes for vocabulary and reading comprehension within one year and six months of intervention respectively, albeit an online delivery. The results of this study have implications for wider use within Singapore and beyond to enhance the literacy skills of students with dyslexia.

Keywords: dyslexia, specific learning difficulty, vocabulary, reading comprehension, writing, independence, self-confidence, online learning

* Correspondence to:
Serena Abdullah, Deputy Director (Curriculum/Resource), English Language and Literacy Division & Lead Educational Therapist, Dyslexia Association of Singapore   Email: serena@das.org.sg

INTRODUCTION

Dyslexia is a specific learning difference that persists throughout one's lifetime. (Ramus et al., 2003). While it is characterised by difficulties primarily with the phonological aspects of reading and spelling (Hulme & Snowling, 2013; Kemp, 2009), the secondary implications also include learning gaps in reading comprehension and writing. As reading comprehension and writing are one of the most important and highly emphasised academic skills taught in school (Curriculum Planning and Development Division, 2020), learners with dyslexia, arguably, may experience significant challenges as the demands and expectations increase substantially throughout their educational journey.

Additionally, strong correlation between reading comprehension and writing has been shown to grow through the primary school years (Bourke & Adam, 2010). In other words, learners with reading difficulties will likely demonstrate gaps in vocabulary acquisition and reading comprehension which includes interpreting and drawing inferences based on the information presented in the text (Mercer & Mercer, 1993) which consequently, impact their development of writing, thus resulting in a delayed writing profile and proficiency. Writing is also deemed as a more complex and sophisticated skill to gain mastery of as it involves both the production and processing of print.

Current Gap in Intervention

In Singapore, learners with dyslexia have access to intervention programmes offered by various providers. In government schools, they can attend the school-based dyslexia remediation programme if they are in primary school levels 3 to 4 (ages 9-10), while externally, they can look to organisations such as the Dyslexia Association of Singapore (DAS) for educational therapy. Most dyslexia remediation programmes in Singapore either primarily focus on building up a learner's functional literacy, or provide a holistic approach, addressing all aspects of literacy. However, this leaves the profile of learners who do not require functional literacy support without a programme that specifically targets their needs in higher order literacy such as reading comprehension and writing.

Singapore Education System

Until 2023, the Singapore education system differentiated secondary level students into three different streams of academic ability, Normal (Technical), Normal (Academic), and Express (Ministry of Education, Singapore, 2023). Each stream had a curriculum that was customised to ensure that the students could learn at their own pace (Ministry of Education, Singapore, 2023). At the tail-end of their secondary education, the students of each stream will sit for the Singapore-Cambridge General Certificate of Education examination (Singapore Examinations and Assessment Board, 2023). Students from the Express stream will take the Ordinary Level papers, Normal (Academic) will take the

Normal (Academic) papers, and Normal (Technical) will take the Normal (Technical) papers (Singapore Examinations and Assessment Board, 2023). While it is possible to take the annual examination as a private candidate, most students would go through 4 years of secondary school education before sitting for the respective examinations. From 2024, the system of streaming students into the three streams will be replaced with Full Subject Based Banding (Ministry of Education, Singapore, 2023) for students who enter secondary school that year. The new system allows greater flexibility for students to learn different subjects at their own pace and ability (Ministry of Education, Singapore, 2023).

The iReaCH™ Programme

The primary aim of iReaCH™ is to support learners in Reading Comprehension and Writing through the deliberate use of in-depth vocabulary instruction and educational technology. This allows them to be better able to apply the vocabulary they encounter in reading and writing texts, and also increase their engagement and participation in the lessons. The teaching principles emphasised in iReaCH™ adhere closely to the Orton-Gillingham (OG) principles to enable learners with dyslexia learn more efficiently and effectively. These include being direct and explicit, diagnostic and prescriptive, structured, sequential and cumulative (Gillingham & Stillman, 1997) in teaching instruction, the delivery of lessons as well as the development of the curriculum and teaching resources to promote greater student independence and agency. The programme also uses Marzano's six step process for vocabulary instruction. iReaCH™, therefore, has been purposefully developed to provide primary and secondary school students with not only the skills and content knowledge to cope with and excel in Reading Comprehension and Writing but also increase their confidence and preparedness during examinations.

REVIEW OF LITERATURE

Dyslexia

Dyslexia is a learning difference which learners with dyslexia have to navigate their entire lives (Ramus et al., 2003). This is due to dyslexia being neurobiological in nature, where regions of the brain that are associated with decoding and recognising words see lower activation than typical readers (Kearns et al., 2019). This manifests as deficits in functional literacy, where learners with dyslexia experience significant difficulties in reading and spelling words. However, the impact of dyslexia goes beyond the word level. It also affects reading comprehension and writing (Roitsch & Watson, 2019), which are considered the higher order literacy skills. As the literacy needs of learners with dyslexia differs with each individual (Maunsell, 2020), there would be those who require continued support in areas of functional literacy, and those who have acquired these skills readily and instead require more support in the higher order literacy skills. This could be despite both groups being at the same age or level in an education system.

Dyslexia and Vocabulary Instruction

Learners with dyslexia face difficulties in vocabulary acquisition and application. In terms of acquisition, Vizhi and Rathnasabapathy (2023) found that a majority of students in their study reported experiencing challenges in acquiring new vocabulary. In terms of application, Sumner et al. (2014) discovered that learners with dyslexia tend to use a more limited range of vocabulary in their writing as compared to their non-dyslexic peers. They attributed it to the lower spelling ability which increases the burden on their working memory, thus decreasing their mental capacity to focus on vocabulary generation (Sumner et al., 2014). It can be concluded that it is necessary to take into account the spelling difficulties that learners with dyslexia face when providing intervention in vocabulary instruction.

Furthermore, vocabulary instruction that utilises multimodal instruction and educational technology would be beneficial for learners with dyslexia (Vizhi and Rathnasabapathy, 2023). This is in line with the Orton-Gillingham Approach to reading instruction, where the focus is on using a multi-sensory approach to instruction (Orton, 1966). This multi-modality is also seen in Marzano's six-step process for vocabulary instruction.

Marzano (2004) described a six-step process that is useful for vocabulary instruction, the first three pertaining to introduction of the vocabulary term, while the remaining three steps focus on exposure via different mediums. The steps are briefly explained below:

- ♦   **Step 1: Explain** - Introduce the new vocabulary term in an accessible manner, using different methods such as stories, images, current events and pictorial representations to facilitate understanding of the term.

- ♦   **Step 2: Restate** - Get the students to use their own words to explain the vocabulary term, generate their own example sentences, which helps them to understand it from their own perspective.

- ♦   **Step 3: Show** - Direct the students to illustrate the vocabulary term in some form, such as a picture or a symbol. This encourages them to think of the term in a non-linguistic way, which can help reinforce the recall of the term.

- ♦   **Step 4: Discuss** - Involve the students in discussions of the vocabulary term, be it classifying or comparing similar or dissimilar terms, coming up with analogies and figurative language phrases.

- ♦   **Step 5: Refine and reflect:** Ask students to review their definition and illustrations of the vocabulary terms learnt, making edits and discussing with their peers about the vocabulary term. This deepens their understanding of the terms as they engage in discussions.

♦ **Step 6: Apply in Learning Games** - Allow students to review and reinforce their understanding of the vocabulary terms through interactive games that are conducted periodically.

These six steps are designed to help students understand and recall the vocabulary terms introduced, and would be especially useful for learners with dyslexia who benefit from multi-modal learning, and being exposed to a concept in various forms. The approach has been used in physical classrooms and found to be effective (Tan & Goh, 2020; Al-Husban & Alkhawaldeh, 2018; Suing, 2012). Research on its effectiveness when used in an online setting has not been conducted.

Dyslexia, Vocabulary and Reading Comprehension

Vocabulary knowledge is intrinsically linked to reading comprehension. To understand a text fully, readers must possess a comprehensive grasp of the vocabulary words employed within it. Consequently, an absence of vocabulary knowledge will result in poor comprehension of a text (Biemiller, 2013). This is exemplified in a study by Sidek and Rahim (2015), where participants cited their inability to comprehend texts in their native language and second language, attributing it to their inadequate vocabulary knowledge. Moreover, it is posited that readers need to possess knowledge of at least 95% of the vocabulary used in a text to be able to achieve sufficient comprehension (Laufer & Ravenhorst-Kalovski, 2010). Okkinga et al. (2023) also found that vocabulary knowledge is an important factor in reading comprehension intervention: students with poor vocabulary experience a higher cognitive load due to the simultaneous processing of the meaning of unfamiliar vocabulary and application of reading strategies, resulting in a lower effectiveness of the intervention.

In terms of vocabulary, instruction is found to be effective in helping students with literacy needs understand a text better (Elleman et. al., 2009). According to Benjamin (2002), vocabulary knowledge is targeted in more than 85% of reading comprehension questions in the GCE 'O' Levels English Paper 2. Explicit and implicit vocabulary instruction were also shown to be effective in helping students achieve better outcomes in reading comprehension due to an increase in their vocabulary knowledge (Al-Darayseh, 2014).

The frequency of vocabulary taught also played a significant factor in reading comprehension outcomes. In a study of English as a Foreign Language (EFL) learners, Masrai (2019) found that there needs to be intentional focus on teaching mid-frequency vocabulary to improve their reading comprehension. Learners with dyslexia showed improvements in reading comprehension after receiving focused vocabulary intervention (Kang et al., 2021).

Dyslexia, Vocabulary and Writing

While dyslexia is typically associated with reading challenges, both children and adults with dyslexia showed almost as many indicators of writing gaps as of reading when both reading and writing were evaluated (Berninger et al., 2001). Furthermore, adults with dyslexia reported that writing, not reading, is their major literacy challenge (Burden, 2005; Mortimore & Crozier, 2006). Moreover, writing is a complex process that involves an application of a wide range of skills that include a strong vocabulary, an understanding of the different genres, text structure and language features as well as organisational skills and self-monitoring behaviour (Kellogg & Raulerson, 2007). School tests and exams in Singapore also conventionally assess students largely based on written expressions and responses.

Drawing reference from the knowledge-telling model (Scardamalia & Bereiter, 1987), a model of developing writing skills as well as the link between long-term memory and vocabulary, there are two knowledge spaces namely, content knowledge and discourse knowledge. Content knowledge refers to subject matter information relating to the topic of the written text while discourse knowledge looks at procedural and genre awareness and understanding. Based on numerous studies, students who have a higher level of content and discourse knowledge are predicted to be more proficient in writing thereby, producing better quality text than those who lack this knowledge (Olinghouse & Graham, 2009; Benton et al., 1995). Vocabulary, is therefore, interwoven and implicated in each of these knowledge spheres.

Vocabulary thus communicates content knowledge since many topics and subject matters consist of specialised vocabulary (Harmon et al., 2005). Vocabulary has also been hypothesised to be a differentiating feature of the different genres of text (Biber, 1988; Halliday & Hasan, 1976).

The knowledge-telling model also suggests that vocabulary may contribute to the writing process through its role as a link between the knowledge stored in a student' long-term memory and his/her ability to apply and transfer that knowledge by selecting the most relevant and appropriate word based on a given context or scenario.

Dyslexia and Online Learning

The context of learning has evolved substantially especially during the period of pandemic when lessons had to be pivoted online, to minimise disruption and to allow continuity of learning to take place, making online delivery an integral component of school education. As a result, the process of teaching and learning is no longer confined to a conventional classroom environment. At the same time, the advent and affordances of electronic learning technologies (Pal & Vanijjam 2020) may have also accelerated the transition of learning to an online space.

With the ubiquitous use of online learning in education, more emphasis should be placed on enabling learners with dyslexia to maximise their learning from this mode of delivery. Therefore, the usability of the online platform and environment including access and engagement with course material, which has a significant impact on student learning (Kori et al., 2016) is critical in ensuring that students remain motivated and participative during the online lessons, resulting in a higher learning gain. In other words, the lack of usability of an online or e-learning system may have a negative effect on student motivation and the ability to retain the lesson materials taught as their focus may be on system functionality rather than content (Ardito et al., 2006).

In a study involving 86 students, Doggett (2008) found that online learning through video conferencing platforms did not significantly affect academic performance in comparison to face-to-face learning. Despite this, students preferred face-to-face instruction because they felt that the online medium did not facilitate interaction with the instructor. Doggett (2008) concluded that the lack of interaction stemmed from their attitude towards using the online medium to access lessons. This highlights the importance of students' attitudes towards the mode of learning being employed for their lessons.

Consequently, while online learning can benefit learners with dyslexia as this mode of delivery allows for self-paced learning and access to multimodal technologies, it is imperative to ensure that the online platform yields a high degree of usability for learners to achieve better engagement and satisfaction. Moreover, teacher and learner interaction and collaboration, through getting learners involved in critical discussions modelled and facilitated by the teachers and providing constructive and consistent feedback to learners on their progress (Gray & DiLoreto, 2016), plays an important role in achieving a more positive learning outcome.

PURPOSE OF STUDY

For the purpose of this study, 'online learning' refers to the delivery of the lessons using an online video communication platform, Google Meet, coupled with relevant and appropriate educational technologies, to increase student engagement and motivation as well as complement the content and learning materials.

This study aims to address the following research questions.

- ♦ **RQ1:** What is the effect of an online literacy programme on vocabulary acquisition for secondary students with learning differences?

- ♦ **RQ2:** What is the effect of an online literacy programme on the application of reading comprehension skills for secondary students with learning differences?

- ♦ **RQ3:** What is the effect of an online literacy programme on writing instruction for secondary students with learning differences?

METHODOLOGY

Participants

For the purpose of this study, only Secondary students who are in the Normal Academic (NA) and Express streams were selected. A total of 30 students were identified and their assessment scores were analysed. While the students selected to be part of the evaluation enrolled at different time points, all received the same intervention duration of 1 year. Some students who were identified also left the programme due to graduation or withdrawal, which resulted in a smaller pool of assessment scores to analyse, especially for the measure for a year of intervention. Furthermore, some data on reading comprehension assessments could not be used as the as the data were either lost or incomplete. The table below shows the number of students assessed on the various components after 6 months and 12 months of intervention respectively.

Table 1. Number of students analysed based on component

Component	After 6 months	After 12 months
Vocabulary	25 students	16 students
Reading Comprehension	18 students	4 students
Writing	3 Case Studies	

Table 2. Number of Students and their Academic Streams for English Subject taken in school

Normal (Academic)	20 students
Express	10 students

Table 3. Level and Student Demographic

Secondary 1	5 students
Secondary 2	12 students
Secondary 3	4 students
Secondary 4	8 students
Secondary 5	1 student

Instrumentation

iReaCH™ Progress Monitoring

Purpose

The purpose of iReaCH™ programme's progress monitoring tools is to measure and track the individual and collective progress of students. It is systematic and ongoing to evaluate the students growth and development by identifying their strengths and weaknesses. The data collected will be analysed to guide instructional decisions, measure effectiveness of the programme and inform future enhancements.

Types of Progress Monitoring

In iReaCH™, formative and summative assessments are conducted. A student will be assessed in three key areas: vocabulary, reading comprehension, and writing. The skills assessed are based on the curriculum that is covered on the programme.

Formative Assessment

Students are continually assessed on the concepts introduced in the lessons through online quizzes, guided work, and independent work. This informs the iReaCH™ Educational Therapists of the gaps in the students' knowledge, which can then be addressed in the following lesson through review and reinforcement of the concepts. One example is the use of Kahoot!, an online interactive quiz platform which allows students to answer questions as they compete for points.

Summative Assessment

Upon joining the programme, students sit for a pre-test, and following that, will sit for a post-test 6 months later and subsequently, the assessment will be administered at the end of every semester.

These assessments evaluate their overall progress and ability to apply the skills learnt throughout the semester.

- ♦ In vocabulary, students are given multiple-choice questions that test their vocabulary knowledge.

- ♦ In reading comprehension, students are tested on their understanding of a reading passage through a mix of multiple-choice and open ended questions. Some of the areas assessed include extracting information, interpretation of figurative language, and inference.

♦ In writing, students' ability to apply the writing concepts introduced throughout the lessons is assessed by examining their written work over the course of the term.

Surveys and Testimonials:

A survey will be conducted to gather feedback from the participating students on their experience with the programme. In addition, as most of the students may have other co-occurring learning challenges in addition to their dyslexia diagnosis, their progress may be varied and gradual. Therefore, testimonials and feedback provided by parents and Educational Therapists also form an important qualitative aspect in the evaluation of the students' overall progress as well as to triangulate the data.

Selection and Implementation:

Formative assessments are conducted during intervention. The observations are recorded by the educators.

The summative assessments are conducted online via Google Forms so that data can be recorded and analysed.

♦ For vocabulary, the items assessed are based on the vocabulary that has been identified from past year Cambridge examination papers that the local students will eventually sit for at the end of their secondary school education.
♦ For reading comprehension and writing, the questions or topics assessed are also based on the Cambridge examination.

These various components are crafted in consultation with our external curriculum consultant, Dr Isabelle Shanti Benjamin.

Data Analysis and Interpretation:

The data collected from the summative assessments is used to track students' progress on the programme, individually and as a whole. Individually, it informs the iReaCH™ Educational Therapists of what gaps need to be filled in the next semester. As a whole, the data provides insight into areas of improvement for the curriculum, such as the themes that need to be covered to meet the students' needs.

Test items that are Multiple Choice Questions (MCQs) are automatically marked by Google Forms, while marking rubrics or marking schemes are provided to the iReaCH™ Educational Therapists when they mark the open-ended questions or essay. This ensures the reliability of the data collected.

Quantitative data:
- ♦ Vocabulary Assessment (Summative)
- ♦ Reading Comprehension (Summative)
- ♦ Survey Forms- Parents and Students

Qualitative data:
- ♦ Writing Assessment (Summative)
- ♦ Testimonials- Parents and Educational Therapists

Intervention

The students who participated in this study were taught vocabulary using Marzano's six-step process. The worksheets they attempt are accompanied with a visual representation of the vocabulary word introduced, and opportunities are given to them to rephrase the word to their own understanding. To further reinforce the vocabulary items, group discussions about the word and its links to current affairs are carried out. Online interactive quizzes that gamify the lesson (e.g. Kahoot! and Blooket) are also used to review what has been taught.

The vocabulary items are grouped into themes and further split into categories for students to have focused and in-depth learning. These themes cover words that are identified to be useful and applicable to either reading comprehension and/or writing. For example, words that describe emotions, which helps students to answer reading comprehension questions that test on interpreting a character's feelings. In writing, words that describe situations and problems (e.g. deteriorate, degrade, aggravate, exacerbate) are among one of the themes introduced to students. This allows them to express their ideas better in essay topics where these words are applicable.

Educational technology is integrated into the lessons to facilitate the online delivery. The use of collaborative learning platforms such as Google Jamboard, Coggle, and Padlet, allow students to build on each other's contributions and learn collectively with mind mapping and group work.

RESULTS AND ANALYSIS

Vocabulary Assessment

The vocabulary assessment consists of 30 multiple-choice questions (MCQs) that test a variety of notable vocabulary words referenced from the national exam papers (O level and NA level). A majority of these vocabulary words are also included in the iReaCH™ vocabulary syllabus, while others are considered words that the students should have knowledge of, and are implicitly covered in the lessons. Students answer the questions on a Google Form.

Pre- and Post-test scores comparison for after 6 months of intervention
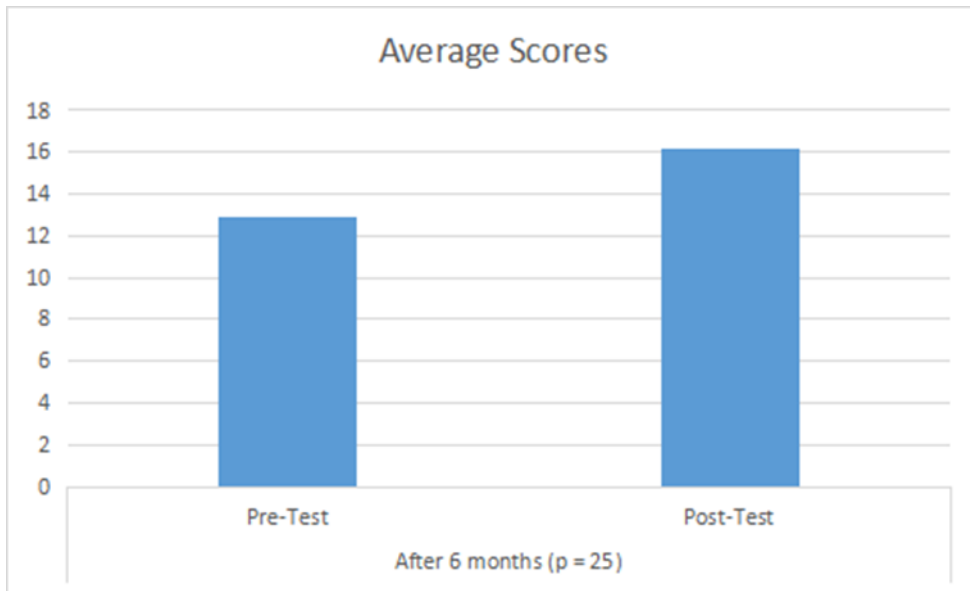
Figure 1: Comparison of average vocabulary assessment scores at pre and post-test after 6 months of intervention.

Table 4. Pre and Post test scores after 6 months of intervention

	Sample Mean	Sample Size	Sample Standard Deviation
Pre-test	12.92	25	4.53
Post-test	16.16	25	4.52

Dependent t-test was conducted to measure the difference between the mean vocabulary scores in the pre-test and post-test after 6 months of intervention.

The results from the pre-test (M = 12.92, SD = 4.53) and post-test (M = 16.16, SD = 4.52) vocabulary task indicate that the intervention resulted in an improvement in vocabulary scores, $t(24)$ = 3.58, p = .0005. The data also has a moderate effect size of 0.72.

Pre- and Post-test scores comparison for after 12 months of intervention
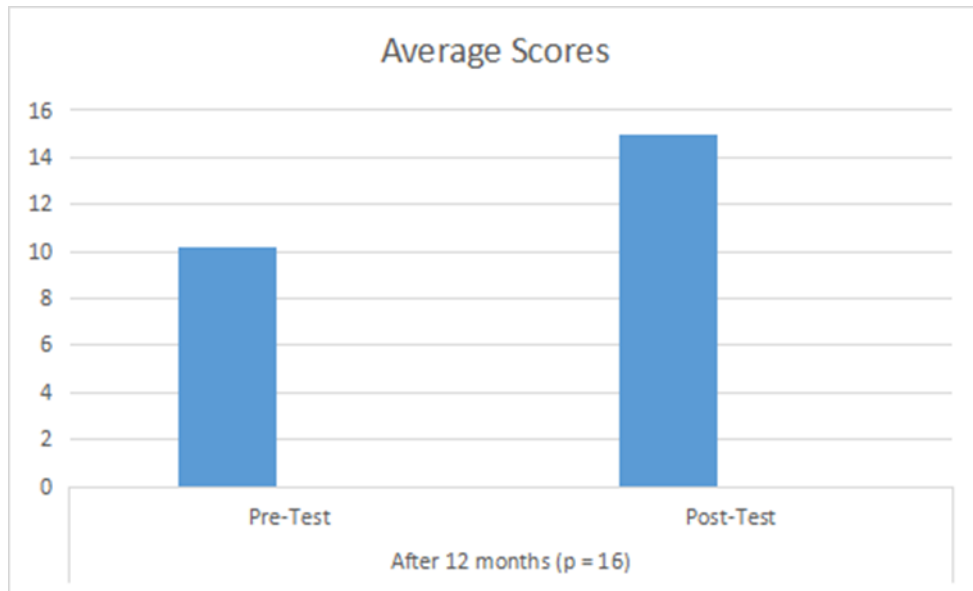
Figure 2: Comparison of average vocabulary assessment scores at pre and post-test after 12 months of intervention.

Table 5. Pre and Post test scores after 12 months of intervention

	Sample Mean	Sample Size	Sample Standard Deviation
Pre-test	10.19	16	3.75
Post-test	15	16	4.62

The results from the pre-test (M = 10.19, SD = 3.75) and post-test (M = 15, SD = 4.62) vocabulary task indicate that the intervention resulted in an improvement in vocabulary scores, t(15) = 3.58, p = .0001. The data also has a large effect size of 1.05.

The results support the effectiveness of the intervention programme in helping students improve in their vocabulary knowledge after being on the programme as early as 6 months with an average increase of 3.24 marks, and even after 12 months with an average increase of 4.81 marks.

Reading Comprehension Assessment

The reading comprehension assessment consists of 10 or more open-ended questions that test a range of comprehension skills. The questions are designed to align closely to the questions that students will face in the national examinations. Two passages are selected, one for lower secondary, and another for upper secondary. Questions are then created for each stream (Express and Normal Academic). In order to mitigate the practice effect, some of the questions are changed in the second assessment. Before iReaCH™ transitioned to an online programme, the assessment was conducted through the pen and paper format. After being converted to an online programme, the assessment was converted to an online format administered through Google Forms.
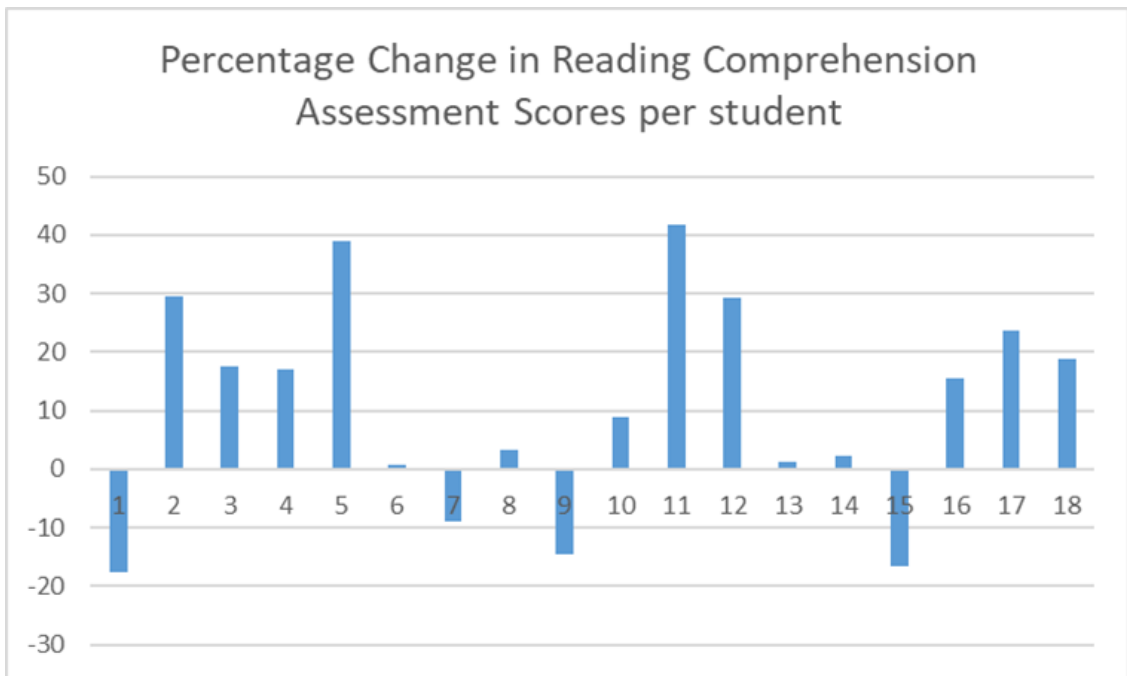
Figure 3: *Percentage change in scores from pre and post-test after 6 months of intervention per student (n=18)*
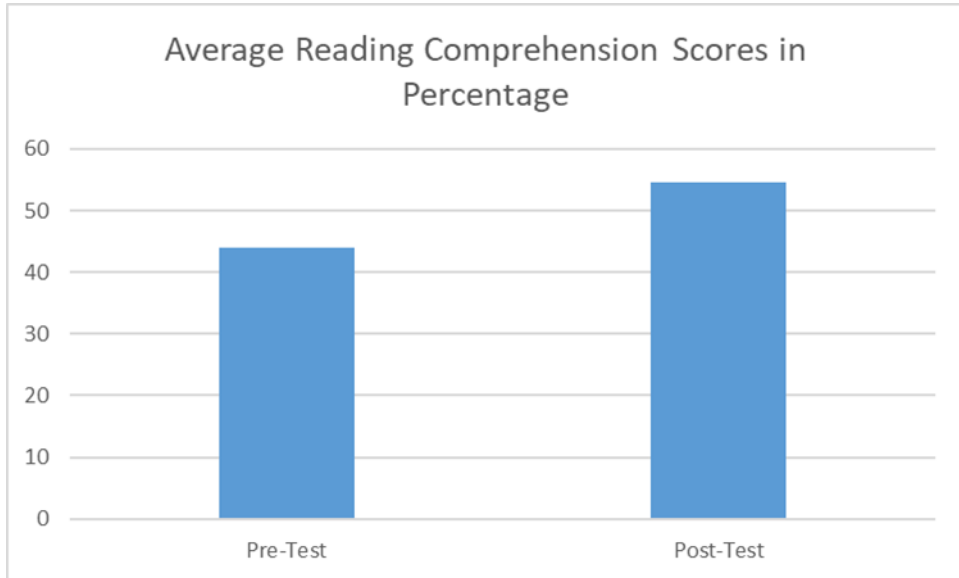
Figure 4: *Average reading comprehension scores from pre and post-test after 6 months of intervention (n=18)*

Pre- and Post-test scores comparison for after 6 months of intervention

Dependent t-test was conducted to measure the difference between the mean reading comprehension scores in the pre-test and post-test after 6 months of intervention. The following details the values used for the test and the calculation.

Table 6. Pre and Post test scores after 6 months of intervention

	Sample Mean	Sample Size	Sample Standard Deviation
Pre-test	44.01	18	17.36
Post-test	54.58	18	19.83

The results from the pre-test (M = 44.01, SD = 17.36) and post-test (M = 54.58, SD = 19.83) reading comprehension task indicate that the intervention resulted in an improvement in reading comprehension scores, t (17) = 2.41, p = .025. The effect size, as measured by Cohen's d, was d = 0.53, indicating a moderate effect.

After 6 months of intervention, there was an average increase of 10.6% in the students' reading comprehension scores, from 44% to 54.6%.

Pre- and Post-test scores comparison for after 12 months of intervention
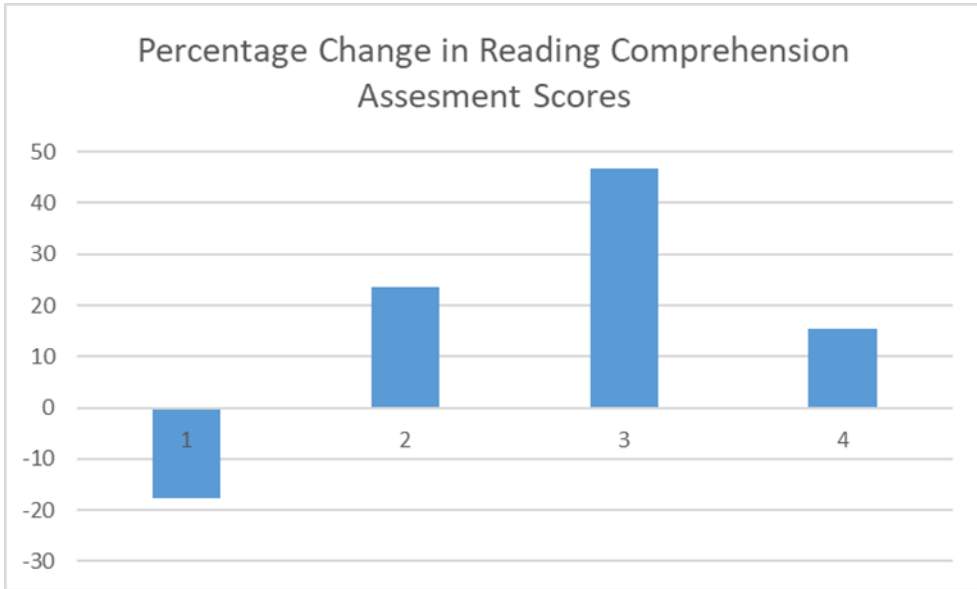
Figure 5: *Percentage change in scores from pre and post-test after 12 months of intervention. (p=4)*
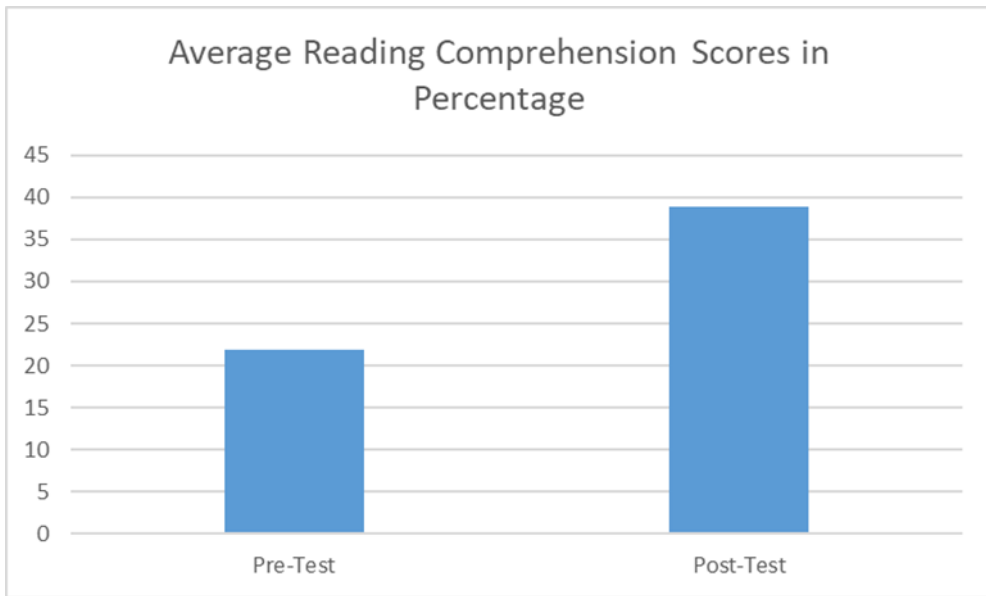
Figure 6: *Average reading comprehension scores from pre and post-test after 12 months of intervention (p=4)*

While the current data suggests that the students continue to show progress after 12

Table 7. Pre and Post test scores after 12 months of intervention

	Sample Mean	**Sample Size**	**Sample Standard Deviation**
Pre-test	44.01	18	17.36
Post-test	54.58	18	19.83

months of intervention, with an average increase of 16.9% in their scores, from 21.9% to 38.9%, the results from the pre-test (M = 21.95, SD = 19.43) and post-test (M = 38.93, SD = 7.20) reading comprehension task indicate that the intervention resulted in an improvement in reading comprehension scores, t (3) = 2.41, p = .29, is not significant. This is expected due to a loss of data during the height of the pandemic, coupled with the majority of secondary school students joining the programme less than a year before the study, which resulted in the amount of data collected to show the students' performance after 12 months to be low. However, the effect size as measured by Cohen's d, was d = 1.05, indicating a large effect.

Overall, the majority of students have been observed to benefit from the support in reading comprehension after a period of 6 months and 12 months. A small group of students (4) showed a regression in their scores after 6 months of intervention, and 1 after 12 months. This can be attributed to the change in level of the test, where they had to attempt the upper secondary assessment instead of the lower secondary assessment as they had progressed to upper secondary when it came to the post-test. The upper secondary assessment had a more challenging passage and set of questions.

Effect Sizes

The effect sizes of the vocabulary assessment ranged from moderate to large, which demonstrates that there has been a transference of skills taught to the students. According to the National Reading Panel, it is suggested that for vocabulary instruction to be effective, various instructional methods should be employed (National Reading Panel, 2000). This aligns with the vocabulary instruction method employed in this programme, the Marzano Approach.

Regarding reading comprehension, the effect sizes ranged from moderate to very large, based on Cohen's d, which identifies d = 0.2 as small, d = 0.5 as moderate and d = 0.8 as large. This shows that the intervention was likely to be effective in improving the students' reading comprehension skills. This may be attributed to the specific instruction in reading comprehension skills and question types covered in the programme, employing the principles of the Orton-Gillingham approach to better support our

learners.

Writing Evaluation

The tracking of writing progress was decided to be a continuous qualitative assessment, where students are assessed on their ability to apply the specific writing skills introduced in the term. The students' writing were analysed qualitatively at the start and at the end of the term.

Case Study:

This case study looks at the written work of secondary school students, who were being taught the structure and features of introduction paragraphs for expository essays for the term. At the beginning of the term, students were observed to start their essays by immediately answering the essay question instead of starting with a general statement which provides context to the essay. Some were also observed to not define the keywords in the essay question.

Student A:
Legend

Essay Question	Students benefit from Co-Curricular Activities. Do you agree?
Introduction Paragraph (Before)	Yes I agree. During co-curricular hours students not only get to learn life-skills, they also get to learn character building and bonding with their CCA mates, and allows them to build teamwork.
Essay Question	**Some people like to stand out from the crowd; others just want to be part of it. Which do you prefer and why?**
Introduction Paragraph (After)	Some people like to stand out from the crowd while others would prefer to fit in. To stand out is to be different from everyone else and to fit in is to be the same. For me, I would personally sit on the fence. If I am in a situation where I am with people I don't like, I would prefer to stand out from the crowd out of spite.

General Statement | **Definition of Keywords** | **Statement of Position** | **Points**
At the beginning of the term, Student A immediately answers the essay question and

follows up with her points for her introduction paragraph. After a term of instruction, she was able to produce an introduction paragraph that provides context, defines the keywords, states her opinion, and lists her points, which is characteristic of what a typical introduction paragraph should be.

Student B:
Legend

Essay Question	Students benefit from Co-Curricular Activities. Do you agree?
Introduction Paragraph (Before)	**As a student, I agree that students benefit from co-curricular activities (CCA). Ever since primary 2 began, students were required to participate in a CCA that interested them.**
Essay Question	**Students benefit from Co-Curricular Activities. Do you agree?**
Introduction Paragraph (After)	**Co-curricular activities (CCAs) are often conducted on a weekly basis. Students are encouraged to take a skill to follow them throughout their school journey. I agree that students benefit from CCAs as time is allocated for students to master a skill, they can find themselves fostering communication skills, and self-growth.**

General Statement | **Definition of Keywords** | **Statement of Position** | **Points**

For Student B, she also initially immediately answered the essay question first, then provided context, but did not define the keywords. At the end of the term, she was able to write an introduction paragraph that also had the necessary components, which shows that she had a better grasp of the structure and features of the introduction paragraph.

Student C:
Legend

Essay Question	Students benefit from Co-Curricular Activities. Do you agree?
Introduction Paragraph (Before)	**I agree that students benefit from co-curricular activities. Co-curricular activities of CCA is important in a student's life as it contributes the most of the life of a student when he or she grows up to be an adult, such lessons include learning life-skills, character building and learning how to work as a team. Without co-curricular activities, students would grow up not knowing the importance of these lessons which can be detrimental to their lives when they start being part of the workforce.**

Essay Question	Some parents say that teenagers' use of smartphones and other electronic gadgets is spoiling family life. What are your views?
Introduction Paragraph (After)	**Smartphones and electronic gadgets have been around for more than 15 years becoming part of our daily lives.** Electronic gadgets come in the form of handphones, tablets, laptops or desktops they are used in communication or entertainment this being a huge thing for teens. Although smartphones and electronic gadgets may be a need for most people some may think otherwise and find it a waste of one's life, degrading the use of these gadgets to merely playing games and nothing else. I find that using smartphones or electronic devices does not spoil family life, if used in moderation. Smartphones can be used to stay in touch with family members despite hectic schedules, not only that but can also increase social interaction online. Lastly, electronic devices can increase creative skills when used correctly for teens.

General Statement | Definition of Keywords | Statement of Position | Points

At the beginning, Student C also showed the same tendency as Students A and B, to start by immediately answering the essay question. He then proceeded to list his points and explained them a little instead of giving the context and explaining the keywords in the question. At the end of the term, he was also able to follow the structure of an introduction paragraph and include the necessary components.

iReaCH™ Online- Progress and Feedback

iReaCH™ switched to a fully online programme with effect from Term 3, 2022 and this was also the period where the evaluation of the programme was conducted.

One of the main considerations for the programme to pivot online is to facilitate the placements of students into suitable classes in a timely and efficient manner, thereby, allowing more students to receive intervention sooner rather than later, without distance being a barrier. Secondly, online delivery has made the conduct of lessons more flexible and convenient for most students including those with hectic schedules or logistical constraints. Thirdly, the Educational Therapists and most of the students have experienced online delivery during the circuit breaker period. Some positive feedback was received with regard to the conduct of online classes.
In order to ensure a smooth transition to a fully online programme, support and

implementation steps were put in place to assist the Educational Therapists, parents and students from Week 3 Term 1 till the end of Term 2, 2022. During this transition period, preparations and arrangements were made including converting resources and teaching materials to online format, sorting out administrative matters and requests for devices i.e. laptops.
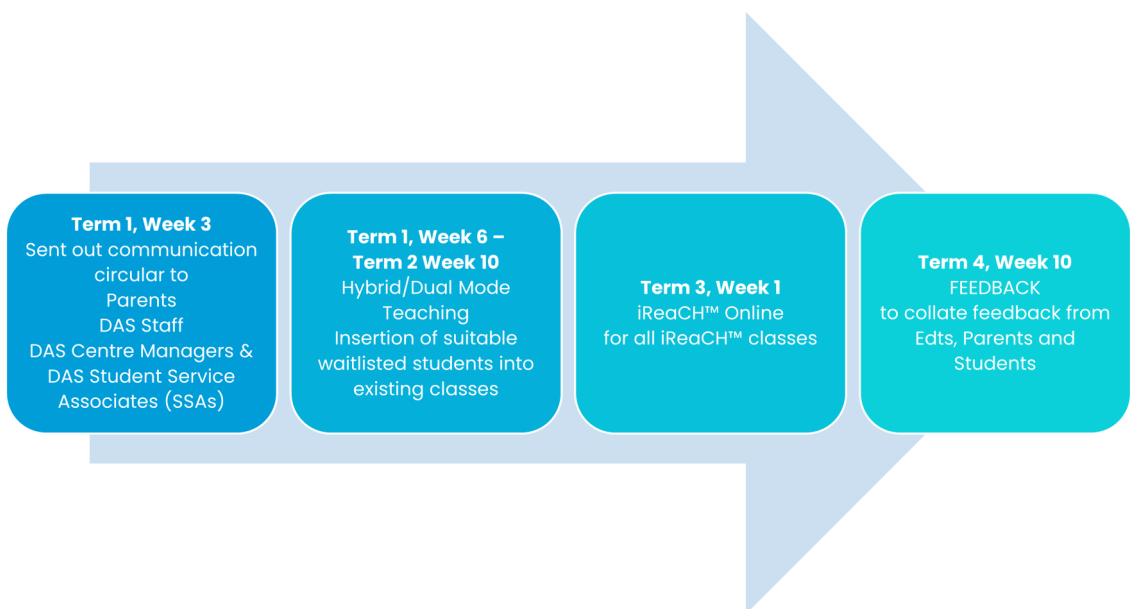
Figure 7: *Timeline of Implementation for iReaCH™ Online Delivery*

Positive feedback received for iReaCH™ online:

♦ Most parents and students find it convenient to access the lessons (no need to travel)
♦ The Educational Therapists feel they can focus more on higher order skills
♦ Insertion of students is much easier for placements or for unforeseen circumstances (e.g. hospitalisation leave (HL) of Educational Therapists), minimising disruption thereby, allowing for the continuity of lessons

Parent Survey on iReaCH™ - programme and online delivery

How satisfied are you with the iReaCH programme for your child?
5 responses
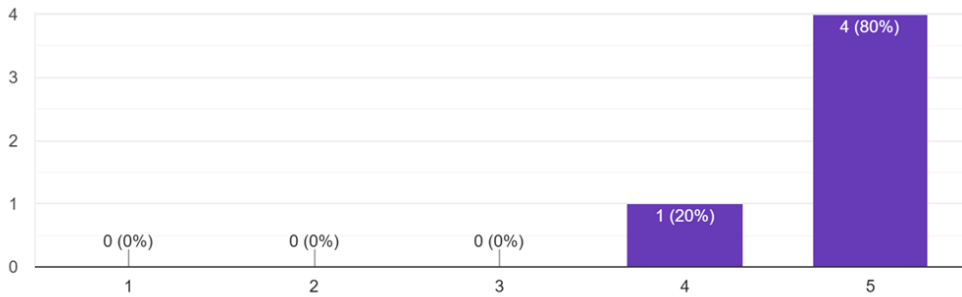
Figure 8: Parents' satisfaction levels with the programme
(1 - Least satisfied, 5 - Most Satisfied). (n=5)

How satisfied are you with the switch to online learning for the programme, since Term 3, 2022?
5 responses
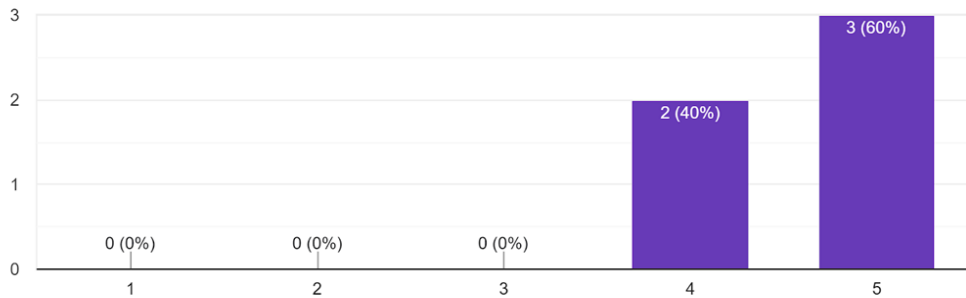
Figure 9: Parents' satisfaction levels with the switch to online learning
(1 - Least satisfied, 5 - Most Satisfied). (n=5)

What do you like about the iReaCH programme for your child? (Tick all options that apply)
5 responses
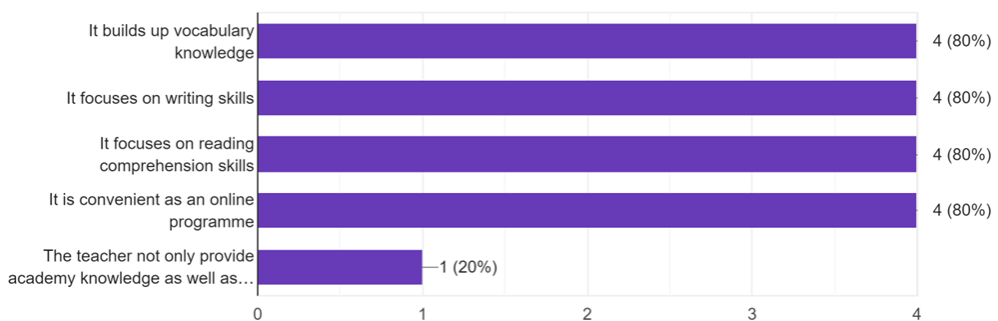
Figure 10: Characteristics of the programme that parents liked. (n=5)

A detailed feedback is obtained through surveys that were rolled out to both parents and students to find out about their reception to the iReaCH™ programme and the online delivery mode. Parents and students alike were asked questions on their satisfaction levels with the programme, the switch to online delivery, what they liked about the programme, and their opinion on the effectiveness of the programme in building confidence in the English language, and the areas they felt they benefited from. Despite reminders, only a total of 5 parents responded to the online survey about the programme.

All parents surveyed were satisfied with the programme and the switch to online learning, with the majority being extremely satisfied.

The parents surveyed like that the iReaCH™ programme focuses on the higher order skills of reading comprehension and writing, vocabulary building, and also it being an online programme, which is also reflected in their response in Chart 5. Additionally, one parent gave feedback that the teacher not only provided academic knowledge, but also guided their child in their future educational path.

Student Survey on iReaCH™ - programme and online delivery

Additionally, a survey was rolled out to students in Week 5, Term 4, 2022 to obtain their feedback on online delivery and the support received on iReaCH™. A total of 26 students completed the survey. The following graphs show the quantitative responses for 2 of the survey items rated by the students.

Almost all students had neutral (score of 3) or positive (scores 4 and 5) reactions to the switch from face-to-face classes to online learning. As an online programme, students benefit from the convenience of learning from home, eliminating the need to travel down to the learning centres. It is unavoidable that there would be some students who prefer face-to-face classes since each student has their preferred mode of learning, which explains the 1 student who was least satisfied (score of 1) of the change in the mode of delivery.

Out of the 4 characteristics of the programme, (Figure 12) the students surveyed liked that it helped build up their vocabulary knowledge, followed by its convenience as an online programme, which is corroborated by the data in Figure 11, where almost all students were neutral or satisfied with the switch to the online mode of delivery.

Half of the students surveyed agreed (score of 4 or 5) that the iReaCH™ lessons have made them more confident in their use of the English language (Figure 13). 12 students had a neutral answer, with 1 student disagreeing.

How satisfied are you with the switch to online learning for the programme, since Term 3, 2022?
26 responses
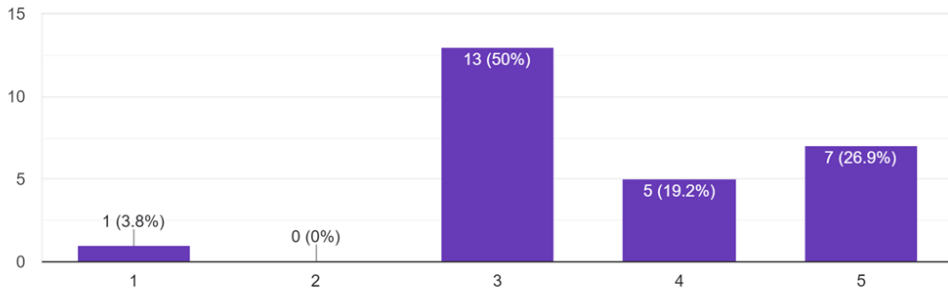
Figure 11: Students' satisfaction levels with the switch to online learning (1 - Least satisfied, 5 - Most Satisfied). (n=26)

What do you like about the iReaCH lessons? (Tick all options that apply)
26 responses
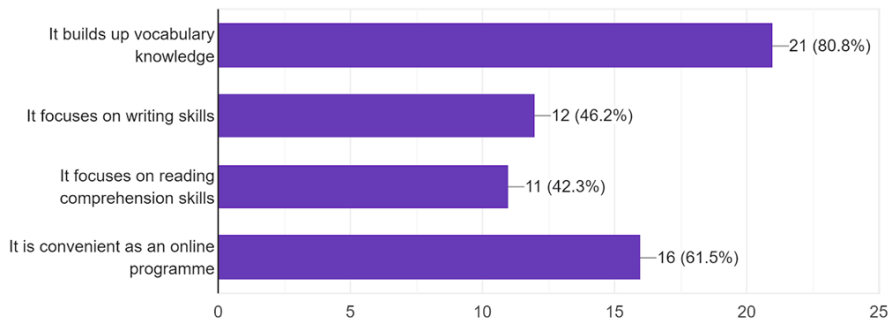
Figure 12: Characteristics of the programme that students liked. (n=26)

The iReaCH lessons have made me more confident in my English.
26 responses
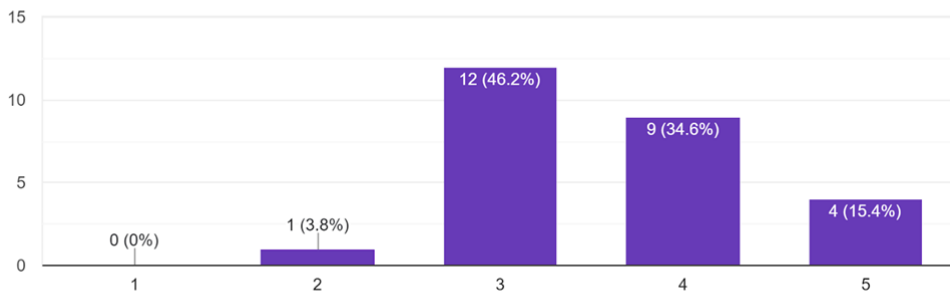
Figure 13: Students' opinion of their confidence level in English after attending the programme. (1 - Strongly Disagree, 5 - Strongly Agree). (n=26)

The survey shows that most students felt they benefited in vocabulary knowledge through the programme. This result corresponds well with the data in Figure 8, where the same number of students also indicated that they liked the vocabulary aspect of the programme. Both reading comprehension and writing shared equal weightage, and 1 student felt he benefited from the programme in all aspects.

Testimonial from Parents

Which areas have you benefitted from since attending iReaCH lessons? (Tick all options that apply)

26 responses
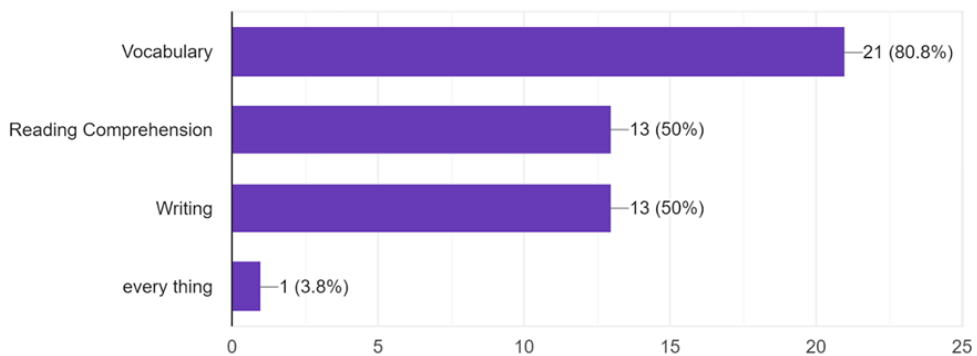
Figure 14: Areas where students felt they have benefitted in since attending the programme. Students can pick more than one option. (n=26)

Parent feels that the iReaCH™ [programme] has improved her child's vocabulary as she is being introduced to new words. Parent also feels that the child is being challenged every lesson, with tips and strategies to help with her writing skills.

Parent shared that her child has made great improvement in school. She also received positive feedback from her Main Literacy Programme (MLP) Educational Therapist that she has improved in her writing behaviour, i.e. she is more keen on attempting writing tasks, as compared to before joining iReaCH™.

All thanks to you and DAS for giving her help and confidence. She scored A2 for her English.

Testimonials from iReaCH™ Educational Therapists

Student D is a very conscientious student who works independently and takes pride in his work. He focuses in class and willingly participates in group discussion. He also adds value to the lessons with his unique ideas and thoughts. Furthermore, he offers more direct responses to his reading experiences supported by reasons, examples, and details. He also shows tremendous improvements in grasping and applying the vocabulary learnt in lessons during his Reading Comprehension and writing tasks. Though he needed guidance occasionally, he is a very independent learner and is able to complete his work with confidence.

Student E has a good range of vocabulary. She is able to give definitions or explain the meaning of some words in her own words and is able to include the vocabulary taught in her writing. She is now also able to come up with synonyms and antonyms related to the vocabulary learnt and has a better understanding of word forms. With exposure to pre-writing activities such as brainstorming and discussions over articles and videos, she is able to generate more content into her writing, creating a cohesive and coherent piece. As for reading comprehension, she has shown improvements in identifying words with connotative meaning, personification and the use of literary devices. She is showing improvements in interpreting the meaning of these figurative languages in comprehension passages.

DISCUSSION

The findings are positive overall, with data from the National Panel (2000) indicating how difficult it can be to achieve significant results or positive effect sizes. The programme, which is delivered online and uses progress monitoring and educational technology to facilitate the lessons and cater to the individual needs of the students, is effective in helping students achieve better vocabulary, reading comprehension, and writing outcomes due to its focus on these skills.

In terms of the mode of delivery, while there are advantages to switching iReaCH™ to a fully online programme (ease of access to lessons and faster placement of students since location is not a factor), it also comes with some challenges:

♦   unsuitability for online delivery, especially students with more severe needs and/or attention issues.

♦ unfamiliarity with online lesson platforms: some students are unfamiliar with or take a longer time to use and be well acquainted with the online lesson platforms - e.g. Google Docs, Jamboard. The Educational Therapists would need to allocate more time and assist with familiarising their students over time.

♦ Students may experience online lesson fatigue by the 2nd hour.

♦ Some students access their lessons on their smartphones and/or tend to open multiple browser tabs despite the Educational Therapists' reminders to students and parents.

These challenges are reflective of the survey results on student satisfaction of the switch to online learning (Figure 11). As concluded by Doggett (2008), student attitudes towards online learning is crucial to their participation in the lessons. With the switch to online delivery, parental involvement and support is critical in ensuring that their child focuses and pays attention during their online lessons. The ease of use of the online lesson platform and engagement is also important to ensure participation in the online lessons (Kori et al., 2016), and this is achieved by using familiar online platforms (Google Meet) and quizzes (Kahoot!, Blooket) during lessons to constantly engage the students. The iReaCH™ team is also exploring ways to better support the Educational Therapists with online delivery as well as mitigate some of the issues experienced with online lessons. As for students who require intervention but are not suitable for online lessons, the team is exploring the idea of having face-to-face lessons as an option for students who are more suited to an in-person delivery.

Additionally, the study shows that even in an online setting, the use of Marzano's six step process to vocabulary instruction can be adopted and is effective in improving vocabulary knowledge outcomes of students.

CONCLUSION

The results showed that, despite the mode of delivery, the majority of students have not only shown gains in their vocabulary acquisition but also in applying the relevant skills taught to their reading comprehension and writing tasks over a duration of at least six months to one year on the programme. Moderate to large effect sizes in vocabulary and reading comprehension further highlight the positive impact of the intervention and also suggest that the teaching approaches and pedagogy used in the iReaCH™ programme have been effective in providing higher order literacy intervention to learners with dyslexia.

LIMITATIONS

This research is not without its limitations. The sample size is small, especially when analysing the reading comprehension scores of students over a period of 12 months. There was no statistical significance in the improvement of test scores for the reading comprehension task after 12 months of intervention, which could be attributed to the adjustment of the difficulty level of text as students progressed from lower secondary to upper secondary, and also the changing of some questions in the test in an attempt to reduce the practice effect. For writing, there was no summative assessment which meant that only a qualitative analysis of sample students' writing could be done to reflect their progress.

FUTURE RESEARCH

The evaluation yields some insights into future and further enhancement of the resources, assessment materials as well as teaching and learning pedagogy, to better facilitate online delivery and increase student engagement and participation. The resources will be enhanced to cover more breadth and depth for the various components, which will help students to be better equipped in tackling the academic challenges they face in schools. In terms of assessments, the separation between upper and lower secondary levels for reading comprehension will be streamlined so that the students will be assessed on the same reading level for the pre- and post- tests even when they progress from lower to upper secondary levels.

REFERENCES

Al-Darayseh, A. (2014). The Impact of Using Explicit/Implicit Vocabulary Teaching Strategies on Improving Students' Vocabulary and Reading Comprehension. Theory *& Practice in Language Studies, 4*(6).

Al-Husban, N., & Alkhawaldeh, A. (2018). The effect of a training program based on Marzano's six step vocabulary process on female EFL teachers' performance in teaching vocabulary in the first Zarqa Directorate of Education. *Dirasat: Educational Sciences, 45*(1).

Ardito, C., Costabile, M. F., Marsico, M. D., Lanzilotti, R., Levialdi, S., Roselli, T., & Rossano, V. (2006). An approach to usability evaluation of e-learning applications. *Universal Access in the Information Society, 4*(3):270–283.

Benjamin, I. S. (2002). An Analysis of the Linguistic Skills and Knowledge Bases Targeted By Comprehension Component of the GCE 'O' Level English Paper 2 from 1998 to 2000.

Benton, S., Corkill, A., Sharp, J., Downey, R., & Khramtsova, I. (1995). Knowledge, interest, and narrative writing. *Journal of Educational Psychology, 87*, 66–79.

Berninger, V., Abbott, R., Thomas, J., & Raskind, W. (2001). Language Phenotype for reading and writing disability: A family approach. *Scientific Studies in Reading, 5*, 59-105.

Biber, D. (1988). *Variation across speech and writing.* Cambridge: Cambridge University Press.

Biemiller, A. (2013). Vocabulary development and instruction: A prerequisite for school learning.

Handbook of Early Literacy Research, 2, 2, 41.

Bourke, L., & Adam, A. M. (2010). Cognitive Constraints and the Early Years; Learning Goals in Writing. *Journal of Research in Reading, 33,* 94-110.

Burden, R. (2005). *Dyslexia and self-concept. Seeking a dyslexic identity.* London, England: Whurr.

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. Routledge.

Curriculum Planning and Development Division (2020). *English Language Syllabus*. Singapore; Ministry of Education.

Doggett, D. A. M. (2008). The videoconferencing classroom: What do students think? *Journal of industrial teacher education, 44*(4), 29.

Elleman, A. M., Lindo, E. J., Morphy, P., & Compton, D. L. (2009). The impact of vocabulary instruction on passage-level comprehension of school-age children: A meta-analysis. *Journal of Research on Educational Effectiveness, 2*(1), 1-44.

Gillingham, A., & Stillman, B. W. (1997). *The Gillingham manual.* Cambridge, MA: Educators.

Gray, J. A., & Diloreto, M. (2016). The Effects of Student Engagement, Student Satisfaction, and Perceived Learning in Online Learning Environments. *International Journal of Educational Leadership Preparation, 11*(1).

Halliday, M. A. K., & Hasan, R. (1976). *Cohesion in English*. London: Longman.

Harmon, J. M., Hedrick, W. B., & Wood, K. D. (2005). Research on vocabulary instruction in the content areas: Implications for struggling readers. *Reading and Writing Quarterly, 21,* 261–280.

Hulme, C., & Snowling, M. J. (2013). *Developmental disorders of language learning and cognition.* John Wiley & Sons.

Kang, M., Kim, Y. T., Jeon, J., Chung, H., Kim, E., & Choi, Y. (2021). The effect of vocabulary depth training on reading comprehension of students with dyslexia. *Journal of Speech-Language & Hearing Disorders, 30*(1), 49-58.

Kearns, D. M., Hancock, R., Hoeft, F., Pugh, K. R., & Frost, S. J. (2019). The neurobiology of dyslexia. *Teaching Exceptional Children, 51*(3), 175-188.

Kellogg, R. T., & Raulerson, B. A. (2007). Improving the writing skills of college students. *Psychonomic bulletin & review, 14,* 237-242.

Kemp, N. (2009). The acquisition of spelling patterns: early, late or never? In C. Wood & V. Connelly (Eds.), *Contemporary perspectives on reading and spelling* (pp. 76-91). Oxford, England: Routledge.

Kori, K., Pedaste, M., Altin, H., Tonisson, E., & Palts, T. (2016). Factors that influence students' motivation to start and to continue studying information technology in estonia. *IEEE Transactions on Education, 59*(4):255–262.

Laufer, B., & Ravenhorst-Kalovski, G. C. (2010). Lexical threshold revisited: Lexical text coverage, learners' vocabulary size and reading comprehension. *Reading in a Foreign Language, 10* (1), 15-30https://files.eric.ed.gov/fulltext/EJ887873.pdf

Marzano, R. J. (2004). *A six-step process for teaching vocabulary. Building background knowledge for academic achievement.* Alexandria, VA: Association for Supervision and Curriculum Development.

Masrai, A. (2019). Vocabulary and reading comprehension revisited: Evidence for high-, mid-, and low-frequency vocabulary knowledge. *Sage Open, 9*(2), 2158244019845182.

Maunsell, M. (2020). Dyslexia in a global context: a cross-linguistic, cross-cultural perspective. *Latin American Journal of Content & Language Integrated Learning, 13*(1).

Mercer, C. D., & Mercer, A. R. (1993). *Teaching students with learning problems* (4th ed). New York: Merrill/Macmillan.

Ministry of Education, Singapore. (2023, June 12). What you need to know about full SBB. What you need to know about Full SBB. https://www.moe.gov.sg/news/edtalks/what-you-need-to-know-about-full-sbb

Mortimore, T., & Crozier, W. R. (2006). Dyslexia and difficulties with study skills in higher education. *Studies in Higher Education, 31*, 235-251.

National Reading Panel (US), National Institute of Child Health, & Human Development (US). (2000). *Report of the National Reading Panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. National Institute of Child Health and Human Development, National Institutes of Health.

Okkinga, M., Gelderen, A. V., Schooten, E. V., Steensel, R. V., & Sleegers, P. J. C. (2023). Does vocabulary knowledge matter in the effectiveness of instructing reading strategies? Differential responses from adolescents with low academic achievement on growth in reading comprehension. *Reading and Writing, 36*(10), 2549-2575.

Olinghouse, N. G., & Graham, S. (2009). The relationship between the discourse knowledge and the writing performance of elementary-grade students. *Journal of Educational Psychology, 101*(1), 37–50.

Orton, J. L. (1966). *The Orton-Gillingham approach.* Orton Dyslexia Society.

Pal, D., Vanijja, V. (2020). Perceived usability evaluation of microsoft teams as an online learning platform during covid-19 using system usability scale and technology acceptance model in India. *Children and Youth Services Review, 119*:1–12.

Ramus, F., Rosen, S., Dakin, S. C., Day, B. L., Castellote, J. M., White, S. & Frith, U. (2003). Theories of developmental dyslexia: insights from a multiple case study of dyslexic adults. *Brain, 126*, 841865.

Roitsch, J., & Watson, S. M. (2019). An overview of dyslexia: definition, characteristics, assessment, identification, and intervention. *Science Journal of Education, 7*(4).

Scardamalia, M., & Bereiter, M. (1987). Knowledge telling and knowledge transforming in written composition. In S. Rosenberg (Ed.), *Advances in applied psycholinguistics, Vol. 2: Reading, writing, and language learning* (pp. 142–175). New York: Cambridge University Press.

Sidek, H. M., & Rahim, H. A. (2015). The role of vocabulary knowledge in reading comprehension: A cross-linguistic study. *Procedia-Social and Behavioral Sciences, 197*, 50-56.

Singapore Examinations and Assessment Board. (2023). *SEAB - GCE O-Level.* https://www.seab.gov.sg/home/examinations/gce-o-level

Suing, J. S. (2012). *The Effects of Marzano's Six Step Vocabulary Process, on Fourth Grade Students' Vocabulary Knowledge, Fluency, and Sentence Complexity.* (Doctoral dissertation), ProQuest LLC, Ann Harbour, Michigan, United States.

Sumner, E., Connelly, V., & Barnett, A. L. (2016). The influence of spelling ability on vocabulary choices when writing for children with dyslexia. *Journal of learning disabilities, 49*(3), 293-304.

Tan, A. W. L., & Goh, L. H. (2020). Comparing the Effectiveness of Direct Vocabulary Instruction and Incidental Vocabulary Learning in Improving the Academic Vocabulary of Malaysian Tertiary Students. *Pertanika journal of social sciences & humanities, 28*.

Vizhi, P. K., & Rathnasabapathy, M. (2023). Language Learning Difficulties of Students With Dyslexia: A Case Study at a Primary School. *Theory and Practice in Language Studies, 13*(11), 2734-2742.

Bridging the Gap: 5 Minutes of Digital Inclusion Empowers Educators in Higher Education for Learner Success

Damaris D. E. Carlisle[1*] and Jennifer George[2]

1. *LASALLE College of the Arts, University of the Arts Singapore*
2. *Goldsmiths, University of London, UK*

Abstract

The "5 Minutes of Digital Inclusion" project aimed to bridge a gap in Higher Education (HE) by equipping educators with knowledge and skills to create digitally inclusive learning environments. This need is due to the challenges faced by learners with disabilities in HE. These challenges stem from issues that include lack of awareness in integrating technology effectively into teaching, and the lack of pedagogical training for educators, often caused by time constraints and budget cuts.

The project addressed these issues by providing educators with easily accessible, bite-sized video modules delivered over a five-week period. These modules aimed to equip educators with the tools and strategies to leverage technology for digitally inclusive learning. While the full effectiveness of the programme requires empirical evaluation, this article explores its potential impact on educators, students, and the overall educational system. This impact could include improved skills for educators to integrate the principles of universal design for learning, increased student engagement, and ultimately, better learning outcomes for students with diverse needs, leading to a more inclusive educational system overall.

Keywords: Digital Inclusion, Higher Education, Educators, Learning Environments, Accessibility.

* Correspondence to:
Dr Damaris D E Carlisle, The Learning Centre, LASALLE College of the Arts, University of the Arts Singapore
Email: Damaris.carlisle@lasalle.edu.sg

INTRODUCTION

Universities in Singapore and the UK are increasingly making the shift towards more inclusive learning environments. This move is not simply aspirational, but rather a legal and ethical imperative enshrined in international declarations like the United Nations Convention on the Rights of Persons with Disabilities (UN CRPD) and the Sustainable Development Goals. The UN CRPD emphasises the right to education for all, promoting equitable access and opportunities at every level, including higher education (United Nations, 2006). Whilst point 4.5 of the Sustainable Development Goals for education state:

> By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations (United Nations, n.d.).

Looking at specific national frameworks, the UK's Equality Act 2010 safeguards individuals from discrimination based on disability, ensuring all students have a level playing field in education. In 2015, the government cut disability allowance for students in Higher Education Institutions (HEI) and put the onus on universities to provide any non-medical support (Weale, 2015). This led to universities needing to make learning and assessment more accessible. In addition, the Public Sector Bodies (Websites and Mobile Applications) Accessibility Regulations 2018 address digital accessibility within the context of HEIs. Whilst this appears to be a solid legal scaffolding, the UK depends on very inconsistent mechanisms for diagnosis, particularly for specific learning differences (SLDs). If a referral for an assessment has been made by an education provider, the wait to obtain an assessment could be up to four years. Unless the family are able to afford private assessments, children have to go without the necessary support. This makes it all the more important that teachers are prepared to support students and make reasonable adjustments even without official assessments. In the context of a university, where most reasonable adjustment plans have already been established for students, there may also be additional challenges where staff may not fully understand these adjustments.

Singapore's Constitution enshrines the principle of equality before the law, while its Enabling Masterplans outline strategies for building an inclusive society that integrates education (Constitution of the Republic of Singapore, 1965; Ministry of Social and Family Development Singapore, 2007, 2012, 2016, 2022). However, the significance of inclusive education extends beyond legal frameworks. It encourages a just and respectful learning environment, recognising the inherent value of each student. Educators have a moral obligation to ensure all learners have the tools and support they need to flourish.

Translating these intentions into tangible realities presents challenges. Educators may face resource constraints, lacking access to qualified special needs educators, assistive technologies, or learning materials adapted for diverse learning styles. Additionally, a lack of awareness and training in inclusive practices can impede progress. Physical accessibility within universities, scheduling accommodations, and adapting assessments can also pose logistical hurdles. The message from the HEI sector after the 2015 announcement in the UK was that most academics and teachers did not specialise in understanding disabilities and did not see the need to spend time learning about them either. If they did see the need, they did not see how they could fit this into their workload to learn, specialise and practice inclusion. Finally, standardised testing and rigid curriculum structures can create pressure for a one-size-fits-all approach, potentially disadvantaging students with diverse learning needs (Blackall et al., 2013; Carlisle, 2023; George, 2022).

Overcoming the challenges of inclusive education requires ongoing support and collaboration. Equipping educators with proper training, fostering inclusive cultures, and allocating sufficient resources are crucial steps towards building learning environments where every student feels valued and empowered to learn. This was the aim of the "5 Minutes of Digital Inclusion" initiative, a collaborative project between Goldsmiths, University of London, and LASALLE College of the Arts, University of the Arts Singapore.

Arising from the question "How can we equip educators with the tools to support all learners without adding to their workload?", the project highlights a variety of learning differences, explores their potential manifestations, shares lived experiences from students and teachers and examines digital tools that can bolster student success. Our approach was to provide easily digestible, bite-sized modules as daily videos and readings, offering content without adding strain to busy schedules. These resources can be revisited or disseminated at the users' discretion, empowering educators with crucial understanding in a time-efficient manner.

Why Inclusion Matters in Higher Education

As access routes to tertiary education diversify, the number of students with declared disabilities in higher education (HE) is on the rise. In the UK, national figures from 2019 indicate that 17.3% of home students identified as having a disability, reflecting a near 50% increase over the previous five years (Hubble & Bolton, 2021). This trend is echoed at the institutional level. For instance, Goldsmiths, University of London reported a declaration rate of 22.3% in the 2022-2023 academic year. Here, mental health (HESA, 2023) needs were the most frequently reported disability, followed by SLDs which include dyslexia, dyspraxia and ADHD.

In Singapore, the Ministry of Education (MOE) does not currently track the number of students with disabilities in Institutes of Higher Learning (IHLs), which include publicly funded universities, polytechnics and institutes of technical education (ITE).   However, when the MOE was questioned in parliament, the response was 3-5% of students entering IHLs between 2019-2023 declared a special educational need (SEN) (Ministry of Education Singapore, 2024). These lower figures are potentially due to factors like limited awareness (Disabled People's Association Singapore, 2016), or stigma (Tyler & Slater, 2018). Regardless of exact figures, the presence of students with diverse needs, whether assessed or not, necessitates a focus on inclusive practices. Frameworks in both Singapore and the UK support this principle.

The UK's Equality Act 2010 safeguards individuals from discrimination based on disability in various aspects of national life, including education. Within the education sector, the Act ensures a level playing field for all students by prohibiting discrimination against students with disabilities by removing barriers. This protection covers all stages of education, from admissions and course selection to teaching practices and assessments. The Act also mandates a duty for educational institutions to make "reasonable adjustments" to cater to the specific needs of students with disabilities. These adjustments can include providing assistive technologies, offering alternative assessment formats, like extended time for exams, or modifying learning materials to ensure equal access to education for all students.

In addition, the Public Sector Bodies (Websites and Mobile Applications) 2018 address digital accessibility by mandating that all websites and mobile applications operated by public sector bodies in the UK must meet specific accessibility standards. These standards ensure that information and resources on these platforms are usable by everyone, including people with disabilities who may need a clear structure for comprehension of text, or rely on assistive technologies like screen readers or text-to-speech software. The regulations outline requirements related to elements like providing alternative text descriptions for images, ensuring proper keyboard navigation for screen reader users, and offering transcripts for audio content. By establishing these accessibility standards, the 2018 Regulations aim to remove digital barriers and promote equal access to information and services for anyone interacting with the UK public sector.

Singapore's approach to inclusive education differs from those that rely heavily on legal frameworks. While its Constitution lacks explicit mention of inclusion, Article 12's guarantee of equality before the law holds weight for many advocates. This article is interpreted to ensure equal access to education for students with disabilities, building a case for inclusive practices in Singaporean universities. However, unlike many countries, legal mandates are not the primary driver. Singapore's commitment to international agreements like the UN CRPD strengthens its focus on inclusion but achieving it likely hinges on a combination of legal interpretation and cultural values. The Enabling

Masterplans, currently in their fourth iteration (Enabling Masterplan 2030 or EMP2030), hold a significant, albeit non-legally binding, influence on governmental support for students with disabilities in Singaporean IHLs. This influence has manifested in several ways. One important impact was the establishment of Disability Support Offices (DSOs) within universities. The Enabling Masterplans have played a vital role in encouraging universities to create these central hubs for students with disabilities (Ministry of Social and Family Development Singapore, 2022). DSOs offer guidance, support services, and facilitate access to reasonable accommodations, ensuring a smoother academic journey for students with diverse needs.

Furthermore, the Masterplans influenced the creation of SEN Funds within IHLs. These funds allocate resources specifically for students with declared disabilities. Financial assistance is provided to aid learning such as acquiring assistive technologies that include screen readers or specialised software. Additionally, SEN Funds can be used to cover the cost of services, including note-taking assistance or sign language interpreters. By promoting the establishment of DSOs and SEN Funds, the Enabling Masterplans have become a driving force in creating a more inclusive HE environment that empowers students with disabilities in Singapore.

While Singapore has implemented policies to support students with disabilities in HE, like the UN CRPD ratification and deployment of support staff, a significant gap still exists. This is because inclusive education is a developing concept, and negative attitudes towards these students often linger among the public (Lien Foundation, 2016), educators and even other students. The current streaming system in secondary schools, focused on academic achievement, might contribute to these negative views. Furthermore, educators in IHLs often lack formal training in supporting students with SEN, leading to feelings of inadequacy and potentially hindering their ability to identify and assist these students (Yap, 2019). These negative attitudes can instil feelings of anxiety and lower self-esteem in students with disabilities (Desombre et al., 2018). Finally, the underuse of support services might occur due to a lack of awareness by students and families, inadequate training for administrative staff, or inherent limitations within current policies.

Challenges in Creating Inclusive Learning Environments

Despite legal mandates and ethical considerations, universities face several challenges in creating inclusive learning environments. Limited time, budgets, and access to trained staff hinder the provision of necessary support services and development of specialised lesson plans. Faculty schedules may be packed, and funding for accessibility services and assistive technologies may be restricted. Staff might not receive adequate training on identifying and catering to various learning differences (Brock, 2010; Everett & Oswald, 2018; Tyler & Slater, 2018; Yap, 2019).

Stigma surrounding disability disclosure can be a significant barrier for students in HE. Fear of judgment or negative perceptions can deter students from seeking the support services and accommodations they require to succeed. This can lead to feelings of isolation and hinder their academic progress. Additionally, faculty members might not be fully aware of the diverse spectrum of learning differences and how they manifest in the learning environment (Burgstahler & Doe, 2006). For example, a student with dyslexia may struggle with written assignments but excel in verbal discussions. Without this awareness, educators may misinterpret these differences as a lack of effort or understanding, leading to missed opportunities to support these students effectively.

Physical accessibility barriers within universities can also create significant challenges for students with mobility impairments. Limited access to elevators, narrow doorways, or a lack of ramps in classrooms and buildings can physically impede participation and limit engagement in the learning environment (Dolmage, 2017). Furthermore, technological integration of assistive tools and converting learning materials into alternative formats like audiobooks or braille can be a time-consuming process. These efforts often require ongoing technical support to ensure students have the necessary resources to access and process information effectively (Burgstahler, 2015; George, 2022).

Large class sizes in higher education can pose another challenge for inclusive practices. With limited individual attention, it can be difficult for educators to personalise instruction and cater to the diverse needs of students with disabilities. Unconscious biases or negative attitudes towards students with disabilities can further exacerbate these challenges (Burgstahler & Doe, 2006). These biases can create a hostile learning environment where students feel unwelcome or unsupported. Moreover, insufficient collaboration between faculty, disability support services, and students with disabilities can hinder the effectiveness of inclusive practices (Carlisle, 2021). Open communication and a coordinated approach are crucial to ensure students receive the appropriate support and accommodations to thrive academically.

These interconnected challenges highlight the need for a multi-pronged approach towards creating a truly inclusive learning environment in HE (Carlisle, 2022, 2023). Applying Universal Design for Learning (UDL) offers a framework to achieve this goal. UDL principles advocate for providing multiple means of engagement, representation, and action to optimise learning for all students (Glass et al., 2013; Meyer et al., 2014). Faculty development programmes that focus on UDL can equip instructors with the knowledge and skills to create learning experiences that cater to diverse learning needs. This might involve using a variety of teaching methods, such as lectures, discussions, simulations, and hands-on activities (Sanger, 2020). Additionally, implementing accessible technologies like screen readers, captioning, and text-to-speech tools can remove barriers for students with disabilities.

METHODOLOGY

Bridging the Gap with "5 Minutes of Digital Inclusion"

This project focused on addressing the complex challenges hindering the creation of digitally inclusive learning environments within universities. These challenges include limited time constraints for educators, budgetary restrictions and even funding cuts in the UK (Everett & Oswald, 2018) that limit resource allocation, a lack of awareness amongst faculty regarding diverse learning needs, difficulties in ensuring the accessibility of course materials for students with disabilities, and the broader issue of digital inclusion (Kluzer & Pujol Priego, 2018). Recognising the limitations on educators' time and resources, Warnes and colleagues (2018) actioned short 5,10- and 15-minute staff development sessions named "5 Minutes of Digital Literacy". This project drew inspiration from its success and adopted the "5 Minutes of Digital Inclusion" initiative. This initiative aimed to overcome these hurdles by delivering bite-sized, accessible learning modules that could be readily integrated into busy schedules. By focusing on short, manageable video segments that promote readily available online resources, the project aimed to ensure that faculty development opportunities were no longer a time-consuming burden but rather an accessible and convenient means of acquiring the knowledge and skills necessary to create digitally inclusive learning environments.

The initiative targeted five key areas. The first was to raise awareness of the most common diverse learning needs. The use of assistive technologies available through commonly used software was highlighted such as text-to-speech and speech-to-text. Time was spent on exploring how to ensure accessible course materials by adding alt text for images, captions for videos and using document headers. Inclusive assessment practices were discussed including alternative assessment methods, reasonable adjustments and the principles of UDL. Finally, accessible learning management systems and accessibility checkers were introduced.

Given the time constraints educators face, the initiative opted for short, easily accessible instructional videos (Beheshti et al., 2018; Mayer, 2021). These videos, each lasting no more than 5 minutes, provided bite-sized learning modules on the chosen topics. By delivering them as daily instalments over 5 weeks, the project ensured participants would not be overwhelmed. The videos were stored on YouTube as unpublished and were curated on a WordPress site for easy access.

Twenty-five video segments were created, covering the most prevalent learning differences encountered in HE, specifically SLDs, ADHD, ASD and sensory disabilities. Mental health conditions, due to their wide spectrum of presentations, were excluded. The videos incorporated explanations of learning differences, assistive technologies, and inclusive practices, practical guidance on using readily available technology to enhance

accessibility as well as the lived experiences of students and staff to further illustrate challenges and solutions.

Each week was loosely focused on a central theme. These were: 1) understanding learning differences and their challenges, 2) assistive technologies for students, 3) creating accessible materials, 4) implementing inclusive assessments, 5) principles of UDL to create a digitally inclusive learning environment. A student or staff member with relevant lived experiences provided video reflections.

To maximise accessibility and encourage reuse, the videos were licensed under Creative Commons, allowing viewers to freely share and adapt the content. Given the unpublished status on YouTube, access was controlled through shared links, ensuring the videos reached only intended audiences. This two-phased dissemination strategy balanced openness with control: the Creative Commons license allowed for broad engagement, while shared links prevented unintended public exposure.

Opt-In vs. Direct Email

Selecting the most appropriate communication channel for awareness raising campaigns significantly impacts audience reach. Opt-in communication channels offer a targeted approach, reaching a pre-qualified audience who has demonstrably expressed interest in the product or service. Whilst this allows for focused messaging, the approach is "preaching to the converted", in other words, there is a strong likelihood that those that sign up are educators with an ongoing interest in the topic. Additionally, this targeted approach can limit initial reach compared to direct email (Junghans et al., 2005).

Direct email offers a broader reach, potentially reaching those who may not be actively searching for information. Unlike targeted email marketing, direct email sends messages to a compiled list of email addresses, in this case HE email directories, regardless of prior consent. While this can be advantageous for raising awareness, it can also be perceived as intrusive, where competition within crowded inboxes can further challenge message visibility.

For this study, the videos and resources were shared during two different time periods:

Phase 1 (Opt-in, September 2023)

The initial release targeted staff at LASALLE and Goldsmiths. During this phase the collaborators had hoped that both IHLs would allow for direct email options to all academic staff. However, relying on an opt-in approach proved to be a limitation, with participation restricted to those who actively signed up for daily email notifications with links to the videos.

Phase 2 (Direct Email, January 2024)

The second phase addressed the limitations of the opt-in approach. Here, the videos were directly emailed to all administrative staff, full-time faculty, and part-time faculty at LASALLE. This ensured wider dissemination and increased accessibility of the resources.

FINDINGS

Viewership Data and Programme Evaluation

"5 Minutes of Digital Inclusion" aimed to be accessible and user-friendly to promote engagement. Data collected between September 2023 and March 2024 revealed promising results. Over 3,000 unique visitors accessed the programme, generating nearly 6,000 total visits. This suggests repeat engagement, with visitors returning for additional content. Furthermore, over 25% of visits exceeded two minutes, indicating user engagement and potentially absorbing valuable content. The most popular videos during this period (detailed in Table 1) were those released in the first two weeks.

Table 1: Data ranging from September 2023 – March 2024

Statistics	Top five most viewed videos
No. Unique Visitors = 3006	Day 7: Student's Lived Experience - Dyslexia
No. Visits = 5815	Day 2: Let's talk about Specific Learning Differences
Visit Duration 2 minutes or more ♦ 1504 ♦ 25.67% of visits	Day 3: Let's Talk About ASD
Countries include:	Day 4 Let's Talk About ADHD
UK, Singapore, Finland, Netherlands, France, Austria, USA, India, Australia, Malaysia, Sri Lanka	Day 6: Text-to-Speech

LASALLE Data

A separate analysis focused on LASALLE educators who received the resources via email between January to February 2024. This targeted approach yielded interesting results. Emails targeted 553 staff members, whilst 1,191 unique individuals visited the resources, generating 2,235 visits between January and March 2024. This suggests information sharing or return visits. Similar to the overall data, over 25% of these visits exceeded two minutes, indicating engagement. While popular videos mirrored broader trends (focusing on specific learning differences and lived experiences), the video on "reasonable adjustments" was particularly popular among LASALLE educators. This warrants further investigation to determine if it reflects a specific need at LASALLE or a broader trend.

Measuring Awareness

Directly measuring the project's impact on student learning outcomes from these resources is a complex undertaking that requires further investigation using methodologies beyond website analytics. While the high viewership numbers indicate a positive reach among educators, this reach alone does not equate to a demonstrated impact on classroom practices. However, this initial engagement has the potential to serve as a foundation for future research exploring areas where educators might require further support in implementing digitally inclusive practices. To definitively understand these needs and the programme's effectiveness in fostering digitally inclusive classrooms, in-depth studies employing a mixed-methods approach that combines quantitative data with qualitative data collection techniques like educator interviews or focus groups would be necessary.

Sustainable Resource

The "5 Minutes of Digital Inclusion" project addresses a need in education by offering educators a reusable resource specifically designed for seamless integration into existing curricula or professional development programmes. The project's core strength lies in its concise format as each module requires only five minutes, making it ideal for busy educators with limited time for additional training materials.

Further enhancing its reusability, the programme provides educators with pre-selected, high-quality videos and readings on digital inclusion. This eliminates the need for educators to invest valuable time searching for and vetting relevant content, allowing them to focus on effective lesson planning and delivery. Additionally, the Creative Commons licensing of the programme materials empowers educators with the flexibility to adapt and integrate the content into their unique teaching contexts and learning objectives. This flexibility ensures the video content remains relevant and impactful across diverse educational settings.

Expansion and Collaboration

Institutional Buy-In

While the project did not use a mandatory direct email approach, alternative communication strategies, such as direct email campaigns, could be explored in future iterations to potentially increase viewership numbers. Implementing a structured framework alongside direct email campaigns, with potential institutional buy-in, could further enhance programme visibility and prioritisation by educators within their busy schedules. This approach could potentially strike a balance between accessibility and encouraging a stronger sense of educational commitment compared to the solely voluntary approach employed in this initial programme offering. However, it is important to acknowledge that mandatory participation, while ensuring engagement, can engender feelings of reduced motivation. Future research could explore the effectiveness of various communication strategies, including a well-structured direct email approach, in balancing accessibility with engagement while minimising feelings of obligation among educators.

Ultimately, widespread programme implementation would undoubtedly facilitate the goals of "5 Minutes of Digital Inclusion". However, the project design acknowledges the reality that individual faculty buy-in might be necessary in some contexts. Gaining such buy-in can be strategically achieved by emphasising the key benefits for educators. Firstly, the concise format, requiring only five minutes per module, minimises the time commitment for busy faculty members. Secondly, the pre-curated, high-quality resources ensure educators can immediately integrate digital inclusion into their existing teaching or professional development activities. This eliminates the need for time-consuming searches for suitable materials. More importantly, the programme can help to raise faculty awareness of best practices in digital accessibility. By highlighting these advantages, "5 Minutes of Digital Inclusion" offers a compelling case for individual faculty members to champion its adoption within their own spheres of influence.

Partnership Opportunities

The programme's adaptability is a significant strength. Exploring the possibility of sharing the programme with Goldsmiths' civic engagement partners, such as a local college in London, can further amplify the programme's reach and impact within the educational community. Offering to run pilot programmes with potential partners demonstrates its possible effectiveness and gathers valuable data to support wider institutional adoption.

DISCUSSION

Impact and Potential of "5 Minutes of Digital Inclusion"

These interconnected challenges highlight the need for a multi-pronged approach towards creating inclusive learning environments in HE (Carlisle, 2022, 2023). Applying UDL offers a framework to achieve this goal. UDL principles advocate for providing multiple means of engagement, representation, and action to optimise learning for all students (Sanger, 2020). However, technology is often underused in HE and educators frequently lack the pedagogical training to effectively integrate it into their teaching (Sahin Izmirli & Kirmaci, 2017). This is where initiatives like "5 Minutes of Digital Inclusion" address a critical need within HE. This type of project can equip educators with the knowledge and skills to create digitally inclusive learning environments, even if the current initiative's full effectiveness requires further empirical evaluation. This section explores the potential impact of "5 Minutes of Digital Inclusion" on educators, students, and the overall educational system.

Traditional faculty development programmes often demand significant time commitments, a substantial hurdle for busy academics. The "5 Minutes of Digital Inclusion" videos overcome this barrier by delivering its content in concise, manageable video modules. This "bite-sized" approach offers several advantages. Firstly, it breaks down complex topics like learning differences and assistive technologies into smaller, less intimidating segments. This facilitates better information absorption compared to lengthy training sessions. Secondly, the 5-minute format allows for easy integration into existing workloads, eliminating the need for large time blocks. Finally, the programme's flexibility allows educators to learn at their own pace, revisiting previous content or focusing on specific areas of interest for a personalised learning experience. These features have the potential to empower educators with the necessary knowledge and skills without adding strain to their demanding schedules.

The knowledge gained from "5 Minutes of Digital Inclusion" can be readily applied in the learning environment. Educators can start incorporating digitally inclusive practices such as using screen reader compatible documents or offering alternative assessment options. These changes can lead to improved student engagement. By understanding learning differences and employing appropriate tools, educators can create a more digitally inclusive and engaging learning environment for all students. This aids active participation and a sense of belonging in the classroom (Bellman et al., 2018). When digitally inclusive practices are implemented, students with diverse learning needs are better equipped to achieve their academic goals, thriving in the classroom environment without facing undue barriers to learning.

The programme's influence may extend beyond individual classrooms, potentially contributing to a more digitally inclusive learning environment for all students in higher education. "5 Minutes of Digital Inclusion" may not only equip individual educators, but also have the potential to create a ripple effect that could lead to systemic change within universities. As more educators participate in such programmes, a broader institutional knowledge base on digital inclusive practices can be built. This, in turn, might nurture a shift in pedagogy towards a more digitally inclusive teaching approach across the institution. Furthermore, educators empowered by the programme could potentially become champions for inclusivity, inspiring colleagues and collaborating with support services to identify and address ongoing challenges. This collaborative approach, if fostered, could lead to lasting systemic changes that extend beyond the learning and teaching culture, potentially impacting areas like curriculum design, resource allocation, and overall institutional policies towards digital inclusion.

LIMITATIONS AND FUTURE RESEARCH

While the "5 Minutes of Digital Inclusion" programme offers a compelling solution to time and budget constraints, there are potential limitations to consider. The concise format might leave educators wanting more depth on complex topics like SLDs or advanced assistive technologies. Additionally, the programme relies on individual faculty members to champion its use, which could limit its long-term impact without broader institutional support.

Furthermore, the primary focus is on equipping educators. For a truly digitally inclusive environment, including resources or training modules for students and support staff would be beneficial. The reliance on shared links for accessing videos might also pose a barrier for users unfamiliar with navigating permission-protected online content.

Finally, the collaborators acknowledge that the funding received for this project was seed funding, which did not extend to greater in-depth analysis or a longitudinal approach. The project has had some secondary interest and usage, however, there is a need for a formal evaluation to assess the programme's true effectiveness. Without such data, it is difficult to measure the impact on educators and student learning outcomes. Additionally, the programme might not be equally adaptable across all disciplines or educational contexts. Certain fields might require more specialised knowledge of accessibility considerations.

These limitations suggest areas for improvement. Developing supplemental resources that provide more comprehensive coverage of specific topics could address the need for greater depth. Advocating for wider institutional adoption could ensure a more lasting impact. Creating resources for students and support staff, and exploring alternative access methods for the videos, could create a more digitally inclusive environment.

Finally, implementing mechanisms to gather feedback and conduct a formal evaluation would provide valuable data on the programme's effectiveness, whilst developing discipline-specific versions could better address the needs of different fields.

CONCLUSION

The "5 Minutes of Digital Inclusion" project presents a practical approach to creating digitally inclusive learning environments within HE. Recognising the time constraints faced by educators, the programme delivers bite-sized, accessible learning modules that have the potential to galvanise faculty with knowledge and skills to create digital inclusive classrooms. This not only benefits students with diverse needs by removing barriers to learning, but also encourages a more engaged and equitable learning experience for all.

The programme's impact extends beyond individual classrooms. By equipping educators with a shared understanding of best practices and fostering collaboration with support services, "5 Minutes of Digital Inclusion" has the capacity to create a ripple effect leading to systemic change within universities. Increased awareness of digital inclusion practices can inspire a shift in pedagogy across the institution, resulting in a more digitally inclusive learning environment for all students. Furthermore, educators can become champions for inclusivity, inspiring colleagues and collaborating with support services to identify and address ongoing challenges. This collaborative approach ensures a sustainable and effective approach to galvanising inclusive digital practices within the university. It is our aim that by empowering educators with accessible knowledge and fostering a collaborative environment, the project paves the way for a more inclusive learning experience for all students.

REFERENCES

Beheshti, M., Taspolat, A., Kaya, S. O., & Sapanca, F. H. (2018). Characteristics of instructional videos. *World Journal on Educational Technology: Current Issues, 10*(1), 61–069. www.wj-et.eu

Bellman, S., Burgstahler, S., & Chudler, E. H. (2018). Broadening participation by including more individuals with disabilities in STEM: Promising practices from an engineering research center. *American Behavioral Scientist, 62*(5), 645–656. https://doi.org/10.1177/0002764218768864

Blackall, H.-L., Peterson, P., Hollowell, J., Shah, N., Selvakumaran, M., Baily, L., Baker, N., Talsania, K., Ibini, M., Kadir, E., Khan, S., Pandya, K., Prokofiev, R., Rees, M., Shah, R., Virdee, M., Vyas, T., Bean, C., Gallacher, J., ... West, L. (2013). University challenge 2013: *The Trailblazers' higher education report* (Issue October). http://www.musculardystrophyuk.org/wp-content/uploads/2015/01/University-challenge-2013-updated.pdf

Brock, T. (2010). Young adults and higher education: Barriers and breakthroughs to success. *The Future of Children, 20*(1), 109–132. https://doi.org/10.1353/foc.0.0040

Burgstahler, S. (2015). Opening doors or slamming them shut? Online learning practices and students with disabilities. *Social Inclusion, 3*(6), 69–79. https://doi.org/10.17645/si.v3i6.420

Burgstahler, S., & Doe, T. (2006). Improving postsecondary outcomes for students with disabilities: Designing professional development for faculty. *Journal of Postsecondary Education & Disability, 18*(2), 135–147. http://www.rrtc.hawaii.edu

Carlisle, D. D. E. (2021). *Learners with special educational needs reflecting on their first year at university: A study of the historical background, recent developments, and issues of concern for students in Singapore* [Doctoral Thesis, University of Western Australia]. https://doi.org/https://doi.org/10.26182/kwsd-a320

Carlisle, D. D. E. (2022). See me, hear me: Successes and challenges of students with invisible disabilities at university in Singapore. *Asia Pacific Journal of Developmental Differences, 9*(1), 119–142. https://doi.org/10.3850/S2345734122000142

Carlisle, D. D. E. (2023). Oh! She's doing fine: Realities and Concerns of Learners with Disabilities at University in Singapore. In K. V. Zhuang, M. E. Wong, & D. Goodley (Eds.), *Not Without Us: Perspectives on Disability and Inclusion in Singapore* (pp. 295–314). Ethos Books. https://www.ethosbooks.com.sg/products/not-without-us-perspectives-on-disability-and-inclusion-in-singapore

Constitution of the Republic of Singapore (1965).

Desombre, C., Anegmar, S., & Delelis, G. (2018). Stereotype threat among students with disabilities: the importance of the evaluative context on their cognitive performance. *European Journal of Psychology of Education, 33*(2), 201–214. https://doi.org/10.1007/s10212-016-0327-4

Disabled People's Association Singapore. (2016). Achieving *inclusion in education: Understanding the needs of students with disabilities.* https://www.dpa.org.sg/wp-content/uploads/2018/08/Incusion-in-Education2.pdf

Dolmage, J. T. (2017). The Retrofit. *In Academic Ableism: Disability in Higher Education* (pp. 67–98). University of Michigan Press. http://www.jstor.org/stable/j.ctvr33d50.5

Equality Act (2010). c. 15. https://www.legislation.gov.uk/ukpga/2010/15/contents

Everett, S., & Oswald, G. (2018). Engaging and training students in the development of inclusive learning materials for their peers. *Teaching in Higher Education, 23*(7), 802–817. https://doi.org/10.1080/13562517.2017.1421631

George, J. (2022). A Strategic Approach to a Disability Inclusive Academic Department. *ACM International Conference Proceeding Series*, 122–128. https://doi.org/10.1145/3563137.3563156

Glass, D., Meyer, A., & Rose, D. H. (2013). Universal design for learning and the arts. *Harvard Educational Review, 83*(1), 98–119. https://doi.org/10.17763/haer.83.1.33102p26478p54pw

HESA. (2023, January 31). *Who's studying in HE.* Higher Education Student Statistics: UK, 2022/23. https://www.hesa.ac.uk/data-and-analysis/students/whos-in-he

Hubble, S., & Bolton, P. (2021). *Support for Disabled Students in Higher Education: Briefing Paper Number 8716*. House of Commons Library. https://doi.org/10.4018/978-1-61350-183-2.ch010

Junghans, C., Feder, G., Hemingway, H., Timmis, A., & Jones, M. (2005). Recruiting patients to medical research: Double blind randomised trial of "opt-in" versus "opt-out" strategies. *British Medical Journal, 331*(7522), 940–942. https://doi.org/10.1136/bmj.38583.625613.AE

Kluzer, Stefano., & Pujol Priego, L. (2018). DigComp into action - Get inspired make it happen (S. Carretero, Y. Punie, R. Vuorikari, M. Cabrera, & W. O'Keeffe, (Eds.). *European Commission*. https://doi.org/10.2760/112945

Lien Foundation. (2016). *Inclusive attitudes survey part 1: Views of the general public* (Issue May). http://www.lienfoundation.org/sites/default/files/FINAL - Inclusive Attitudes Survey Part 1_30May16.pdf

Mayer, R. E. (2021). Evidence-Based Principles for How to Design Effective Instructional Videos. *Journal of Applied Research in Memory and Cognition, 10*(2), 229–240. https://doi.org/10.1016/J.JARMAC.2021.03.007

Meyer, A., Rose, D. H., & Gordon, D. (2014). *Universal design for learning: theory and practice*. CAST Professional Publishing.

Ministry of Education Singapore. (2024). *Students with disabilities admitted to IHLs.* News, Parliamentary Replies.

Ministry of Social and Family Development Singapore. (2007). *Enabling Masterplan 2007-2011.* https://www.msf.gov.sg/policies/Disabilities-and-Special-Needs/Pages/default.aspx

Ministry of Social and Family Development Singapore. (2012). *Enabling Masterplan 2012-2016.* https://www.msf.gov.sg/policies/Disabilities-and-Special-Needs/Pages/default.aspx

Ministry of Social and Family Development Singapore. (2016). *3rd Enabling masterplan 2017-2021*. https://doi.org/10.15713/ins.mmj.3

Ministry of Social and Family Development Singapore. (2022). *Enabling Masterplan 2030.* https://www.msf.gov.sg/docs/default-source/enabling-masterplan/emp2030-report-(final2).pdf

Sahin Izmirli, O., & Kirmaci, O. (2017). New barriers to technology integration. Eurasian *Journal of Educational Research, 72*(2017), 147–166. https://doi.org/10.14689/ejer.2017.72.8

Sanger, C. S. (2020). Inclusive pedagogy and Universal Design approaches for diverse learning environments. In C. S., Sanger & N. W., Gleason (Eds.), *Diversity and inclusion in global higher education: Lessons from across Asia* (pp. 31–71). Palgrave Macmillan. https://doi.org/10.4324/9781315797885

The Public Sector Bodies (Websites and Mobile Applications) Accessibility Regulations 2018 (2018). https://www.legislation.gov.uk/uksi/2018/852/contents/made

Tyler, I., & Slater, T. (2018). Rethinking the sociology of stigma. *Sociological Review, 66*(4), 721–743. https://doi.org/10.1177/0038026118777425

United Nations. (n.d.). Education - *United Nations Sustainable Development. Sustainable Development Goals.* Retrieved February 4, 2019, from https://www.un.org/sustainabledevelopment/education/

United Nations. (2006, December 13). *United Nations Convention on the Rights of Persons with Disabilities.* https://treaties.un.org/doc/Publication/CTC/Ch_IV_15.pdf

Warnes, M., & Williams, J. (2018). Reflections on delivering online digital media courses: Learning from the learners. *Conference: 10th International Conference on Education and New Learning Technologies,* 154–162. https://doi.org/10.21125/edulearn.2018.0093

Weale, S. (2015, December 3). Government to cut funding for disabled university students. *The Guardian.* https://www.theguardian.com/education/2015/dec/02/government-to-cut-funding-disabled-university-students-jo-johnson

Yap, A. (Ed). (2019). *Perspectives on disability support at institutes of higher learning in Singapore.* Singapore Management University.

Effectiveness of support for speech-writing and presentation skills for students with learning differences: Teachers and students perspectives

Rosalyn Wee[1], Premadevi d/o Perumal[1] and Charis Chiong Zi Qi[1]

1.   Dyslexia Association of Singapore

Abstract

During the transition from upper secondary to tertiary education, developing effective study skills becomes a crucial skillset for efficient learning, especially so for dyslexic and struggling learners. Dyslexia, a formally diagnosed lifelong learning difference (Ramus et al., 2003), is a neurological condition that primarily impacts reading, writing, and spelling abilities. Struggling learners, on the other hand, have no formal diagnosis of learning difficulties and may face challenges in areas like foundational knowledge, attention, focus, emotional and behavioural regulation. Both groups need intervention when they transition to tertiary education to cope with the increasing demands and maximise their learning capabilities. This paper explores teachers' perspectives on speech-writing and presentation skills within the Dyslexia Association of Singapore's iStudySmart™ programme, which is an online and technology-aided programme that focuses on time management, prioritisation, planning, organisation, and tertiary-level writing and presentation skills for higher education learners. The programme employs the Universal Design for Learning framework, catering to diverse learning styles. Teachers apply the Orton-Gillingham principles for dyslexic learners, offering a diagnostic, prescriptive, cumulative, multi-sensory, and emotionally-sound learning environment. These versatile teaching methodologies allow students to select learning tools like relevant educational applications, videos, quizzes, and note-taking to attain their desired learning outcomes. Using these frameworks and principles, teachers assess students' progress through personalised and informal assessments, which are then woven into the learning materials and learning experience during the course of the programme. This paper also shows educators how technology-aided online learning, combined with personalised teacher intervention, enables dyslexic and struggling learners to self-monitor and attain their learning goals.

Keywords: executive function, higher education, dyslexia, specific learning difficulty, study skills, perspectives, online learning, special educational needs

* Correspondence to:
Serena Abdullah, Deputy Director (Curriculum/Resource), English Language and Literacy Division & Lead Educational Therapist, Dyslexia Association of Singapore Email: serena@das.org.sg

INTRODUCTION

In Singapore, there have been multiple pushes to support learners with special educational needs (SEN) or those who might learn differently and are struggling to cope with the demands in Institutes of Higher Learning (IHLs). The Ministry of Education (MOE) in Singapore has begun to inculcate a more inclusive society including its education system in light of all the challenges that students with SEN might face (Ministry of Education, Singapore, 2023)

There are more students identified earlier in pre-school, primary school and secondary school. These students can access specialist programmes and services such as the early intervention programme in pre-schools, and the school-based dyslexia remediation programme offered in mainstream schools by MOE to those diagnosed with dyslexia. In addition, students with dyslexia, including those without a formal diagnosis, can access educational therapy at the Dyslexia Association of Singapore (DAS).

For the general population of students in DAS, they are diagnosed with dyslexia. This learning difference affects 10 percent of the population of which 4 percent have dyslexia severe enough to warrant immediate intervention according to international prevalence rates. Similarly, based on prevalence rates reported by the European Dyslexia Association (n.d.), dyslexia occurs in every part of the world regardless of culture or language, and affects 9 to 12 percent of the population of which 2 to 4 percent of the population are severely affected.

Like other learning differences, even though individuals might learn compensatory strategies to overcome their learning challenges starting from a young age, it is a lifelong learning difference (Ramus et al., 2003). Cognitive challenges associated with dyslexia and other learning differences will continue into post-secondary education, also known as higher education, tertiary education, IHLs, and adulthood (Hatcher et al., 2002). Therefore, awareness, specialist support, and resources should continue to be made accessible to students with learning differences such as dyslexia even as they progress to be made accessible beyond secondary school.

In a recent study by Moats (2019) and Texas Academy Performance Report (Texas Education Agency, 2022), it was found that 5 to 17 percent of the student population in higher education will have dyslexia or some form of learning difficulty. However, only 2.9 percent was reported which means that the number of students struggling and experiencing difficulties are being under-identified and under-reported.

The Persistent Gaps in Singapore's Higher Education Landscape

Singapore's MOE aims to support post-secondary learners who have a diagnosis in IHLs and aims to support and provide guidance to students from pre-enrolment to graduation

(Ministry of Education, Singapore, 2023). However, the efforts remain inconsistent in different IHLs (Carlisle, 2022a; 2022b).

A study conducted in Singapore showed that participants who achieved a university education reported a positive tertiary learning experience (Hewes, 2020). Reasons include that they have become more mature, developed compensatory strategies, and learning has become much more manageable (Hewes, 2020). In addition, they also pursued subjects and specialisations about their interest and passion (West, 2014). However, while a group of students may have a positive experience, others may not. The issue with lifelong learning differences like dyslexia, is that it persists throughout one's lifetime and one might experience many difficulties. The issue of under-identification might also be widespread.

For some, compensatory strategies learned when younger might not be useful or sufficient to help one cope in a different situation such as the more demanding and rigorous academic landscape in the post-secondary or higher education landscape.

In other situations, as learners transition to higher learning, academic demands might increase; in contrast, specialist support, resources, and awareness may not. This may prove to be a struggle for those with learning differences (Dobson Waters & Torgerson, 2021; MacCullagh et al., 2017; Mortimore & Crozier, 2006; Olofsson et al., 2015; Pino & Mortari, 2014).

Therefore, the iStudySmart™ (iSS) programme was developed by DAS to support learners who learn differently, including those with dyslexia, in higher education.

The DAS's iStudySmart™ programme

iSS is a 20-week online learning programme to support tertiary students, and upper secondary students transitioning to tertiary education who learn differently, including those with dyslexia, to gain study skills, executive functioning skills, and life skills such as time management and prioritisation, planning and organisation, tertiary writing skills and presentation skills. The acquisition of these skills is particularly important especially at the tertiary level to help empower students with learning differences and struggling learners.

The first two modules, namely time management and prioritisation as well as planning and organisation, guide and teach learners to use computer and handphone related educational applications to manage their time effectively for school and/or work. Additionally, the tertiary writing module supports students on how to do their research effectively based on their research topic, evaluate the validity and reliability of sources, and cite and reference the sources used in their research, which can be applied to their own assignments and research projects in school. Lastly, developing good public speaking/presentation skills, i.e. being able to present confidently has become an

expectation at the tertiary level (Nash et al., 2016). Being able to express thoughts and ideas well are critical communication skills that are part of the 21st-century skill frameworks which help tertiary learners be in good stead when preparing to enter the workforce (Hunt et al., 2009). The programme culminates in a final presentation where learners present their chosen research topic to their fellow peers, teachers, and parents.

iSS is a combination of elearning on a learning management system (LMS) with customised Sharable Content Object Reference Model (SCORM) packages and online consultations for personalised coaching and mentoring. During elearning weeks, students access content material uploaded on the LMS at their own learning pace and convenience and complete their elearning assignment; while during the online consultation sessions, the teachers will touch base with the students to clarify doubts, check for understanding, and help the students catch up on their elearning assignments. At the same time, the teachers will work closely with the parents to make sure that the students have well-rounded support while on the programme. As the elearning and online consultation sessions are all online, the paper will use the term 'online learning' throughout the paper.

Figure 1: iStudySmart's SCORM package on the elearning platform

The pedagogical approaches that form the core of the iStudySmart™ programme, include multi-modalities and Orton-Gillingham (OG) teaching principles traditionally used in literacy instruction for learners with dyslexia (Gillingham & Stillman, 1997). The OG teaching principles include being direct and explicit, diagnostic and prescriptive, structured, sequential and cumulative (Gillingham & Stillman, 1997). In addition to the OG principles, Universal Design of Learning (UDL) is employed

Since the inception of the programme in 2019 till the end of 2022, 108 students who have varied learning profiles and learning needs have received specialist intervention on iStudySmart™ . The majority of the students were from Institutes of Technical Education (ITEs) and Polytechnics and most of them have a dyslexia diagnosis. Some of them also have other co-occurring challenges which include speech and language impairment (SLI), Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), and Mild Intellectual Disability (MID) in addition to their dyslexia diagnosis. Further, the common learning challenges observed in most students include gaps in executive functioning skills i.e. poor time management, prioritisation and organisation skills, difficulties in communication, tertiary writing and presentation skills. For this paper, we have also included a learner - Student H, who was struggling in a local polytechnic but had yet to get a professional diagnosis on the nature of his needs. He was not diagnosed with dyslexia and showed difficulties with verbal expression and articulation. He struggled to speak in proper sentences by omitting words, using the wrong word, and making frequent grammatical errors.

LITERATURE REVIEW

As the amount of literature on teachers' perspectives on the effectiveness of such programmes is nascent, research was gathered on the considerations made for college readiness or transition programmes for learners with difficulties, diagnosed or undiagnosed.

Definition of Dyslexia

DAS adheres to the definition of dyslexia led by Rose's report (2009) from the United Kingdom, and the United States Department of Education Report on the Individuals with Disabilities Education Act (2011).

> "Dyslexia is a type of specific learning difficulty identifiable as a developmental difficulty of language learning and cognition. It is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling. Characteristic features of dyslexia are difficulties in phonological awareness, verbal memory and processing speed. Co-occurring difficulties may be seen in aspects of language, motor coordination, mental calculation, concentration and personal organisation, but these are not, by themselves, markers of dyslexia."

Dyslexia in IHLs

There is little literature and research on students with learning disabilities and how they are coping despite their increasing number in higher education settings (Carlisle, 2022a; 2022b; Heiman & Precel, 2003; Sparks & Lovett, 2009). This is especially true in the Singapore context (i.e. Carlisle, 2022a; 2022b). Despite this, we can gather that in IHLs, there are various factors that shape a struggling learner's experience.

Teacher perceptions or misconceptions of SEN may affect how students eventually get support on programmes (MacCullagh et al., 2017; Mortimore & Crozier, 2006; Olofsson et al., 2015; Peltier et al., 2022; Pino & Mortari, 2014). This may be why some students with learning challenges in higher education feel that they do not receive enough support (Dobson Waters & Torgerson, 2021; Griffin & Pollak, 2009).

Other challenges and difficulties that students may also face would be understanding course materials and the understanding and writing of complex text types that use a higher level of written language such as journal articles (Tops, et al., 2023), taking notes during lectures (Olofsson et al., 2012) and preparing for tests (Kirby et al., 2008). It may therefore, be important, for students to learn and master compensatory strategies which include study skills, time management skills and deep learning approaches (Kirby et al., 2008).

Writing

In addition to word reading and spelling difficulties that learners with dyslexia face, they also have difficulties with writing. Neuroimaging studies have shown that both reading and writing processes overlap similar regions in the brain (Pugh et al., 2006). Therefore, like reading comprehension, writing is also a complex process that involves translating ideas into writing and transcription skills (Hayes & Berninger, 2010).

According to a study by Mortimore and Crozier (2006), 62 out of 136 male students in a British tertiary setting, diagnosed with dyslexia, reported that they had difficulties in note-taking, organisation of essays, and expressing their ideas in the written form, as opposed to their counterparts without dyslexia. Their writing difficulties have persisted since they were in elementary school.

The writing difficulties are further explored in another study by Tops et al. (2013) when they compared the writing of 100 learners with dyslexia and another 100 learners without dyslexia studying in institutes of higher learning in Belgium. Students were reported to show that writing produced by learners with dyslexia had difficulties with structure and fluency. Therefore, both studies show that lecturers and tutors in tertiary institutions would need to provide more support to these struggling learners through remedial intervention.

Presentation skills (Oral and public speaking issues)

Other than the difficulties mentioned above, learners with dyslexia also have difficulties with oral and presentation skills. In a survey conducted of Singapore entrepreneurs, entrepreneurs with dyslexia reported lower levels of self-reported public speaking ability compared to their peers without dyslexia even though the scores for public speaking were still positive and above the midpoint score of 3, which is neutral. This scoring attribute may have been negatively impacted by their negative learning experiences and ongoing struggles with literacy. (Hewes, 2020).

Furthermore, oral presentations are commonplace in tertiary levels and workplaces and being able to present confidently and coherently has become an expectation (Wee & Abdullah, 2023). In a study on the utilisation of study skills support among 136 male students in 17 British higher education institutions in the United Kingdom, Mortimore and Crozier (2006) showed that 24% of the dyslexia group reported difficulties expressing ideas orally, compared with 10% of the comparison group (Stanton, 2019). As such, there is a need to teach oral presentation skills to students in the tertiary group who will be transitioning to the working world where such skills are indispensable.

Self-esteem and anxiety

Students with dyslexia alone or with other SEN also often struggle with self-esteem, anxiety, lower self-concept and behavioural issues. Humphrey and Mullins, as cited in Antonelli et al. (2014) states that "students with dyslexia experience significant challenges and difficulties with regard to self-esteem and self-perception". Bazen et al. (2022) also states that socio-emotional factors, such as coping skills and self-perceived literacy skills and environmental factors also have a stronger influence on the student's perceived consequence of dyslexia than their actual literacy abilities. These challenges are further reinforced by Zuppardo et al. (2023)'s study, which showed that students with dyslexia tended to show lower levels of self-esteem, higher levels of anxiety and more behavioural problems, compared to their counterparts with no dyslexia.

A literature review by Livingston et al. (2018) also outlines how dyslexia negatively affects their self-esteem, mental well-being, behavioral issues and social problems. Individuals diagnosed with dyslexia have primary consequences such as poor work and academic achievements, which in turn can lead to negative self-evaluation, poor self-esteem and self-concept. These affect their emotional well-being, behaviour and their social relationships. Klassen et al. (2011) and Livingston et al. (2018) found that anxiety and depression may continue from childhood into adulthood as language and academic skills are still important in adulthood. Additionally, individuals with dyslexia and poor self-efficacy in social skills may have trouble with making friends, and this also persists when they become adults (Carroll & Iles, 2006, as quoted by Livingston et al., 2018).

In a review done by Arts et al. (2022), adolescents with Developmental Language Disorders (DLD) are found to have more social anxiety and shyness as compared to their peers. They also struggle to form and maintain friendships, are at risk of being bullied and are at a higher risk of developing depression. These struggles are explained by Arts et al. (2022) that as adolescents with DLD have cognitive deficits and difficulty with social and inner dialogue (Vissers and Tomas, 2020), this language difficulty affects them such that they are not able to internalise beliefs and perspective of others in their social dialogue. They are also unable to regulate their behaviour based on their internal dialogue. This may result in them either not forming good friendships or causing them to encounter problems or have higher levels of hyperactivity. As such, it is more likely for them to feel isolated and misunderstood. This may result in them either not forming good friendships and/or causing them to encounter problems or have higher levels of hyperactivity.

All these factors conspire to make the demands of tertiary education especially challenging for students with special educational needs. In order to address these, iSS was developed, building on the principles below.

Pedagogical Approaches

Orton-Gillingham Principles

Previous research has demonstrated the efficacy of OG, which was a teaching approach specifically designed for students to significantly improve academic performance for those with dyslexia in areas such as reading and writing (e.g. Lim & Oei, 2015). The fundamental principles of OG primarily encompass multisensory techniques, diagnostic and prescriptive methods, cognitive strategies, structured, sequential, and cumulative instruction, as well as being emotionally sound (Rose & Zirkel, 2007).

Numerous studies have demonstrated the positive impact of OG on students not only with dyslexia but also with learners with other learning disabilities (e.g. Stebbings & Kline, 2020). Similarly, to assist students in overcoming learning obstacles, particularly dyslexia, numerous institutions, such as DAS, have adopted the OG principles not only into its English Main Literacy Programme (MLP), benefiting learners who learn differently, including individuals with dyslexia as well as those who are not formally diagnosed, but also in different programmes such as the Mathematics and Chinese programmes, and iSS (DAS, 2024).

Universal Design of Learning

Other than the OG principles, it is also critical that interventionists take into account the students' preferred ways to learn such as the Universal Design of Learning (UDL)

approach. As written by Johnson-Harris and Mundschenk (2014, p. 168), "UDL encompasses an effective approach to classroom procedures, ensuring that instruction is designed to be accessible to all potential learners", including those with learning differences and those who are at risk of school failure.

In alignment with the UDL principles, students are provided with various choices to actively participate in the learning setting (CAST, 2020). This approach aims to motivate learners across diverse learning needs, including those with dyslexia or struggling learners, by sparking their interests and encouraging engagement in the learning process. Educators facilitate learning by removing learning obstacles, adjusting and adapting the curriculum to assist the educational progress of both students with and without learning disabilities (Nicholl et al., 2013).

In a meta-analysis done by Dewi and Dalimunthe (2019), it was found that UDL was applied across all kinds of subjects of studies, and even across different age groups. UDL helped students in kindergarten express themselves better (Mavrou, Charalampous, & Michaelides, 2013), allowed students on the Autism Spectrum with moderate to severe intellectual disabilities to better understand lesson materials (Knight et al., 2013). In addition, UDL was effective in increasing reading and student engagement for high school students (Hall et al., 2015).

Computer-mediated learning/online learning

The benefits of adopting suitable pedagogical approaches and principles for online delivery support for learners with learning challenges are captured in several studies. Students with dyslexia frequently utilise multimodal approaches and could thus find multi-sensory methods in learning beneficial. (Andreou & Vlachos, 2013). It was found that when educational content is presented in different modalities and forms, there was an activation of positive emotional and motivational states encouraging the processes of analyses and synthesis.

Such content presentation features include text video lectures, illustrative and cognitive graphics, mind maps, interactive visual schemes with drag-n-drop operations, educational clarification animation, interactive multimedia presentations, etc. (Rembach et al., 2019). By having flipped classrooms using e-learning as part of the online learning approach, students who are underachieving can help improve their motivation, learning attitude and engagement, which in turn allows them to learn more effectively (Al-Otaibi, 2017; Chou et al., 2021; Nouri, 2016; Cheng et al., 2020). The iSS modules incorporate a variety of learning methods including videos, interactive drag-and-drop quizzes and animation to deliver educational content.

Neurodiversity and Co-occurring difficulties

Executive Function

Smith-Spark and Gordon (2022) examined automaticity and executive abilities in dyslexics in a theoretical review. They found an impairment in the Supervisory Attentional System in the brains of those with dyslexia, hence leading to challenges with their working memory (Jeffries and Everatt,2004), executive functioning (Booth, Boyle and Kelly, 2010), strategy use (Meltzer, 2012) and prospective memory (Khan, 2014). These challenges and the lack of automaticity – such as having to allocate attentional resources to otherwise automatic functions also lead to difficulties to in adapting to new or unfamiliar cognitive tasks, and therefore, affecting problem-solving and decision-making abilities.

Rosello et al. (2020) studied the impact of persistent and remittent Attention Deficit Hyperactivity Disorder (ADHD) in adults. They found persistent ADHD severely impacts executive, behavioural, and functional impairments across life domains, highlighting the importance of continued monitoring and support of these individuals. For adults with ADHD in remission, the impact was more subtle, giving rise to problems related to attention and hyperactivity, and impulsive behaviours. The differences in impact highlights the complexity of ADHD symptoms in adulthood. Their findings show that there is a need for targeted intervention to address the diverse challenges faced by these individuals with ADHD. Townes et al. (2023), conducted a meta-analysis of various studies on ADHD and Autism Spectrum Disorder (ASD) children and adolescents, and found that there were no significant differences in executive function profiles between the ADHD and ASD groups. There were distinct differences as compared to typically developing individuals, highlighting the importance of tailored interventions and support strategies for the ADHD and ASD individuals.

Memory

Smith-spark and Lewis (2023) note that dyslexia-related deficits in memory are likely to have a deleterious impact on life chances and life satisfaction. To find out more, they conducted research into the lived experience of people with dyslexia. One such area was to find out the way in which tools and assistive technologies were used by adults with dyslexia to support their memory in both everyday life and in their university studies. Adults with dyslexia self-reported that they are more dependent on tools and technology to support their memory compared to adults without dyslexia. (Smith-Spark, Ziecik and Sterling,2017). Yet, university students with dyslexia have reported that they are resistant to or have a disdain for training related to assistive technologies.(Draffan, Evans, Blenkhorn, 2007). In Smith-spark and Lewis's study conducted on twelve female university students exploring the various memory techniques they developed, participants were found to prefer traditional pen and paper tools while they also used digital technology

tools such as phones and laptops to write reminders. As such, the participants used a combination of traditional and digital tools. For example, the participants used phone reminders in combination with diary and calendar entries. They also expressed a preference for easy-to-use technology and found that navigating specialist technology took a lot of effort, was over-complicated and overwhelming.

iSS was designed to address these issues in order to help tertiary students with difficulties progress further in their education journey. However, it is important to evaluate the efficacy of this approach and therefore, for this research project, feedback was obtained from a) the teachers administering the programme and b) the students undertaking the programme.

METHODOLOGY

Research Design

The research undertaken adopted a quasi experimental, mixed-methods, phenomenological approach, leading to both quantitative and qualitative data. Phenomenology is an approach to qualitative research that describes the meaning of a lived experience of a phenomenon for several individuals (Finlay, 2012), which in this case are the teacher perceptions of the online technology-aided programme for students with learning differences in the area of speech-writing and presentation skills.

Research Questions

Taking all these factors into consideration, a study was conducted to find out the effects of iSS:

- ♦ **RQ1:** Does applying the Orton-Gillingham principles for dyslexic and struggling learners in elearning and online consultation lessons result in changes to speech-writing and presentation skills?

- ♦ **RQ2:** Does technology-aided online learning combined with personalised teacher intervention enable students with learning differences to self-monitor and attain their learning goals in terms of speech-writing and presentation skills?

- ♦ **RQ3:** Is there a difference in terms of pedagogical instruction between Secondary School learners and IHL learners in the areas of speech-writing and presentation skills?

Figure 2: Teachers' experience in terms of years

Research Participants

Participants included four teachers on the programme who also happened to be the researchers of this paper.

- ♦ **Teacher 1:** 5.5 years of teaching experience, 3.5 years of teaching iSS
- ♦ **Teacher 2:** approximately 10 years experience of teaching, 2 years of teaching iSS
- ♦ **Teacher 3:** 6.5 years of teaching experience, 2 years of teaching iSS
- ♦ **Teacher 4:** 15 years of teaching experience, 1-2 years of curriculum development of iSS, 7 years of teaching experience on iSS

In addition to the teachers, the students from the 2022 cohort also took part in the research study. Students included upper secondary and tertiary students (n=29; figure 3

by school levels) enrolled on iSS. There were a total of two intakes and each intake lasted for 20 weeks each with the first intake from January to June and the second intake from July to November. All students came from mainstream secondary schools and were from 14 to 17 years old. The tertiary students included those who attend Institutes of Technical Education (ITEs) which provides technical and vocational training, spanning a total of two to three years. Students who attend Polytechnics learn through a project-based approach which spans approximately three to four years. Lastly, there was a student from a special education school, which is a social service agency that provides special education, vocational training and employment support services for post-secondary school students with mild intellectual disability (IQ 50-70).

While most of our students have a diagnosis of dyslexia, we also work with students who may be diagnosed with ADHD, ASD as well as students with speech and language impairment. This generally means that they would struggle with executive functioning skills as well as have gaps in their communication skills.

Apart from students with diagnosis, the teachers also supported another group of students who may face similar issues, but may not necessarily have a diagnosis of a learning difference. At DAS, support also extends to students who learn differently, as they also face challenges in areas like foundational knowledge, attention, focus, and emotional and behavioral regulation.
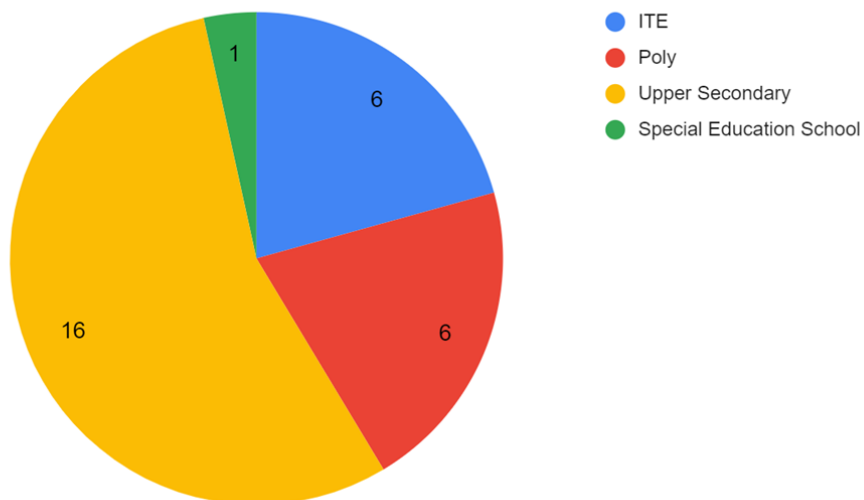
Figure 3: Demographics of the 2022 student cohort across two intakes
(January to June and July to November)

Student who learns differently - Student H

Student H, a pseudonym, is an iSS student who does not have a formal diagnosis of any SEN, who similarly shows difficulties in terms of articulation, verbal expression and the general use of English.

Instrumentation

For RQ1 and RQ3, a teacher questionnaire was administered (Refer to Appendix A) comprising qualitative and quantitative questions. It involved asking the teachers' perspectives on how the OG principles were used to support the students through various methods such as using the elearning platform and online consultations. It involved asking the teachers on how they accommodated different students with different learning challenges such as those with no diagnosis, MID, and dyslexia. Feedback from was also obtained on how they taught secondary school students as opposed to tertiary school students in terms of the various skills, especially with regards to speech-writing and presentation skills.

For RQ2, qualitative teacher feedback was also gathered to evaluate the progress of the students. Thematic analysis was conducted using Braun and Clark's (2006) framework to analyse whether students develop self-monitoring skills and improve in their writing and speaking skills. Semantic themes using colour codes were derived using a top-down approach or theoretical thematic analysis after looking at the data corpus. If self-monitoring was seen, it will be coded in light green in the overall behaviour. Otherwise, it will be light pink. Any positive themes derived from writing and speaking will be in light green as well while any negative themes will be in light pink. If there are no changes to be seen, then it will be left uncoloured.

Step 1	Become familiar with the data
Step 2	Generate initial codes
Step 3	Search for themes within the data corpus
Step 4	Review themes and determine whether there were any other semantic
Step 5	Define final themes
Step 6	Write-up

Figure 4: Adaptation of Braun and Clark's framework (2006) to doing thematic analysis for the purpose of doing research paper.
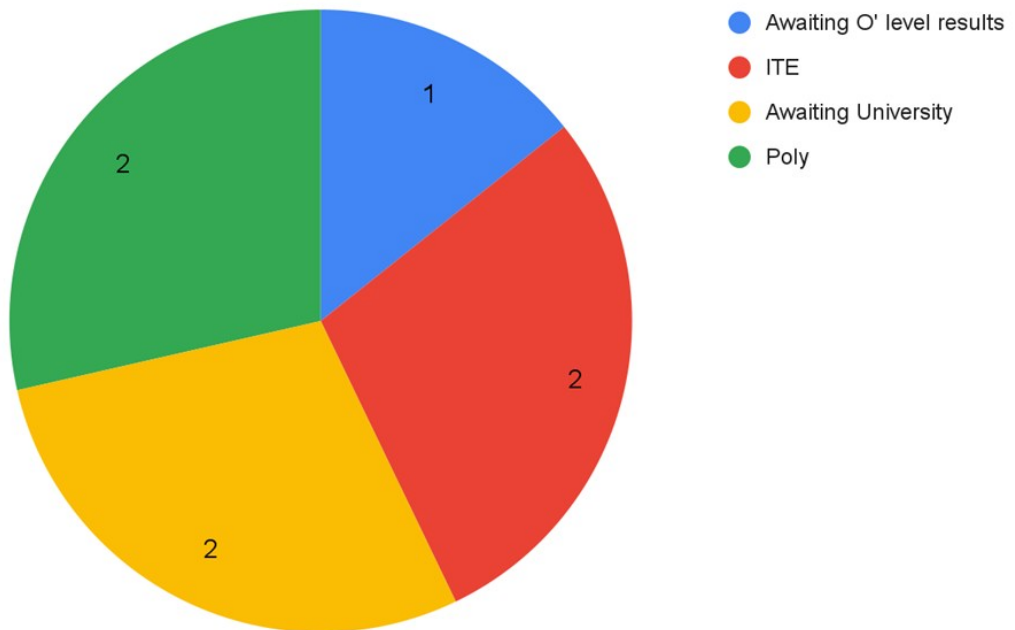
Figure 5: Demographics of the 2022 student cohort across two intakes (January to June, July to November) who participated in the six months post-intervention interview

For triangulation, pre- (Appendix B) and post-intervention questionnaires for secondary school students (Appendix C) and IHL students (Appendix D) were created and administered for each intake after referring to various questionnaires on presentation skills (Higgins-Opitz & Tufts, 2010), areas of learning difficulties (Learning Disabilities Association of Minnesota, n.d.), and self-efficacy (Research Collaboration, 2015).
The pre-intervention questionnaire was administered before the intervention started and the post-intervention questionnaire was conducted during the last session of the programme.

Post-intervention interviews were also conducted with the students at least six months after their intervention ended on Zoom due to convenience. All students were invited to participate in the interview but only seven responded that they were comfortable doing the interview. The interview responses provided a glimpse into what the students thought had helped them the most to cope with the expectations and demands in their school.

Table 1: Breakdown of e-learning and online consultation weeks with speech writing and presentation skills in bold.

Weeks	E-learning Modules/Online Consultations	Weeks	E-learning Modules/ Online Consultations
Week 1	Executive Function: Time Management and Prioritisation Part 1	Week 11	**Tertiary Writing Part 4**
Week 2	Executive Function: Time Management and Prioritisation Part 2	Week 12	**Online Consultation 5**
Week 3	Executive Function: Time Management and Prioritisation Part 3	Week 13	Tertiary Writing Part 4
Week 4	**Online Consultation 1**	Week 14	Tertiary Writing Part 6
Week 5	Executive Function: Planning and Organisation Part 1	Week 15	**Online Consultation 4**
Week 6	Executive Function: Planning and Organisation Part 2	Week 16	Presentation Part 1
Week 7	**Online Consultation 2**	Week 17	**Online Consultation 5**
Week 8	Tertiary Writing Part 1	Week 18	Presentation Part 2
Week 9	Tertiary Writing Part 2	Week 19	**Online Consultation 6**
Week 10	Tertiary Writing Part 3	Week 20	**Final Presentation**

Intervention

The students received intervention for approximately 20 weeks, in 2022. The first intake took place from January to June and the second intake was from July to November. The online intervention combined both e-learning and computer-mediated approaches. Multi-modalities and key teaching principles such as OG and UDL have also been built into the design and content of the e-learning course materials as well as the online consultation sessions.

The e-learning elements were designed and developed with careful consideration for secondary school students with learning difficulties transitioning to IHL and for IHL students to cope with the increased demands in the higher education landscape.

For students who showed more learning needs and challenges, extra consultation sessions maybe arranged to support them. The teachers also conducted weekly check-ins with the students and parents using emails, phone calls, or texts.

Towards the end of the 20 weeks intervention period, students were trained on how to write a speech, improve their draft, create slides and deliver their speech in front of a live audience. In addition to their speech delivery, the students were also trained to answer questions on the spot during the Question-and-Answer segment posted by the judges from the judging panel who received the students' speeches before the live presentation.

RESULTS AND DISCUSSION

RQ1: Does applying the Orton-Gillingham principles for dyslexic and struggling learners in elearning and online consultation lessons result in changes to speech writing and presentation skills?

The teachers used various instructional and teaching strategies in line with the OG principles to help students understand the modules' content on speech and presentation skills.

The module on speech and presentation was presented in a structured, sequential and cumulative format where students learned the features of a speech, the importance of purpose, audience and context, research and draft their speeches. The teachers would often use scaffolding and step-by-step instructions in order to make sure that the instructions are diagnostic and prescriptive, meeting the varying needs of the students. While one student may need more demonstrations of the use of an application, another student may need instructions typed down for them to use the same application.

Qn 8) As facilitators of the programme that teaches speech writing and presentation skills, have you noticed any changes in the following areas? Click all that apply.

4 responses
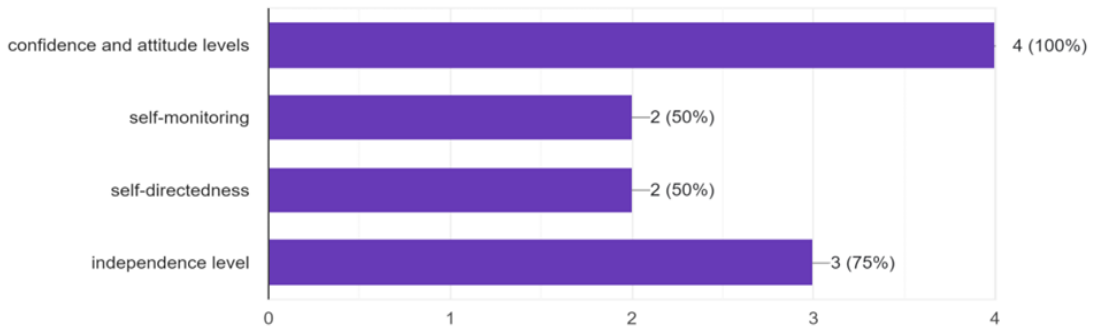
Figure 6: Graph to show teachers' perceptions of gains made by students in post-survey

In addition, the teachers ask concept checking questions to make sure the content is cognitive, and that students are able to understand the concepts being taught. Multisensory methods in the form of videos and pictures are used to not only engage students, but also make the task requirements direct and explicit. The teachers would also make sure that the lessons are emotionally sound and would give praise and encouragement to their students to boost their confidence and self-esteem.

As depicted in Figure 6, the teachers responded to the question of whether they noticed any changes in the areas of confidence and attitude levels, self-monitoring, self-directedness and independence level. Most of them saw a change in the students' confidence, attitude and independence level, but not all facilitators saw a change in the areas of self-monitoring and self-directedness.

By applying the OG principles, the teachers supported the students through a journey of learning how to research, draft and present a speech. The teachers shared the following observations about their students:

> *"Student T was quite wary about joining the programme. She was quite soft spoken too and was quite unsure about herself. However, after going through the programme, she shared with me that she had improved in her confidence and self-esteem. She was also able to monitor time on her own to prepare for the N' and O' level examinations."*

"Student K joined the programme after his parents asked him to do so. He was very worried about his preparedness for the N' levels and was wondering how iSS might help. After he attended the programme in 2022 Run 1 from January to June, he improved in how he scheduled his revision study time to get ready for his exams. In the recent post six months interview, he also shared that he used the time management strategies he had learnt to manage his time while in ITE as well."

"Student C is already someone who is rather outspoken as compared to her peers in her same class but she was still not confident enough to speak up in a larger group of audience. After attending the programme, her confidence level is much higher as she knows what to take note of and how to portray herself better. She has now become a speaker with confidence to speak up and express her thoughts through her speech."

"Another student, HJ, is very reserved and not confident of herself. She knows that she is a muddlehead sometimes and has difficulties completing assignments on time due to her lack of prioritisation. After the programme, she improved a lot in terms of her independence and confidence. She is now someone who crossed the hurdle and is able to present in front of a huge audience even though she was trembling beforehand. She now knows how to better manage her time and prioritise her commitments so that she can complete her tasks in time."

"Student D has become more confident in the process of presentation and speech writing after attending the program, as she has shared her personal experience in another DAS "programme. Student D's mum has also shared with me about how he has practiced his own speech over and over again during the days leading up to the final presentation, which was something she said he would have not done on his own previously."

"Student G is a student who started out being very shy and quiet. He would frequently nod his head and smile but would not answer most of my questions. He would use the chatbox more often. As time went on, he started to speak a little more, became more verbally responsive, being confident of his opinions and expressing them and overcame his shyness which allowed him to progress in his confidence and attitude. He did well in his final presentation and won best speaker."

"Student M is a student who was very busy and found it difficult to set aside time to access the iSS portal and complete the assignments. However, he would attend the consultations regularly. He was receptive to feedback but was still poor in his self-monitoring of logging into the portal or asking follow-up questions in the first term. When we started working on his speech, he was more engaged and monitored his progress in researching/writing out his speech and working on the slides for the final presentation. More importantly, he was aware of the need to improve his time management skills."

RQ2: Does technology-aided online learning combined with personalised teacher intervention enable students with learning differences to self-monitor and attain their learning goals in terms of speech-writing and presentation skills?

Teachers' Perceptions

Based on the teacher feedback obtained from the teacher questionnaire, all shared that the online consultations were effective with three teachers stating that the online consultations were "very effective" and one responding that it was "effective" in helping students understand the key concepts in the preparation of speech-writing and presentation skills. One of the teachers had this to share,

> *"The online consultations **allow immediate feedback from the facilitators** when going through **materials/assignments** from the **speech-writing and presentation skills [modules].** It also **allow[s] live demonstrations/examples** to let students **better understand** what to do and also learn from their peers during the online consultation."*

The teachers collected the observations throughout the intervention and shared their thoughts about their students in terms of self-monitoring in order to improve their speech writing and presentation skills.

Some students were able to be more aware of their abilities and asked questions whenever they were in doubt.

> *" …was a **conscientious learner who took initiative** in **asking me questions when she was in doubt** about what she learnt during e-learning."*

> *"provided him with **some examples** of how the structure of the speech should be, based on the KWL chart. He was able to write out the three main points in the KWL chart and also **elaborate on the first two main points in the speech planner with my guidance.** He **sourced for the online links on his own.** He **finished writing the third main point and conclusion on his own**"*

> *"after his **rehearsals and tips,** he was more fluent."*

They also observed that majority of the students still needed a lot more guidance when it comes to improving their speeches and presentation skills.

> *"...able to handle tasks given to him **with guidance,** and has a good learning attitude."*
> *"...**not able to write out a speech on his own** but was **guided on how to do research using the keywords** and find appropriate **pictures for slides."***
> *"... able to write and express her ideas, but **needed help to make her ideas more succinct."***

Qn 2) How effective are the online consultations in helping students understand the key concepts in speech writing and presentation skills?

4 responses

Not effective   Very effective
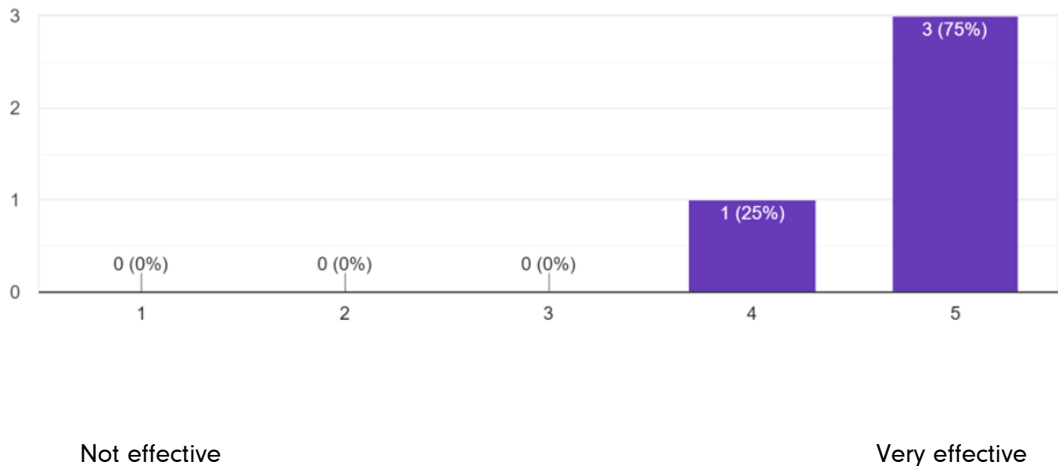
Figure 7: Graph to show how effective the online consultations were in helping students understand key concepts in speech writing and presentation skills

Students' Perceptions

The observations from the teachers were further triangulated with the results from the pre - and post-intervention questionnaire responses by the students. Students were asked to rate their responses on a Likert scale of 1 representing "never" and 5 "all the time" before and after the intervention.

T-scores and effect sizes were also calculated on selected questions for the Tertiary Writing and Presentation modules to have a better understanding of the level of progress i.e. significant, minimal or no improvement demonstrated by the students. Effect sizes are used where sample sizes are moderate, in order to compare between different questions, with an effect size of 0.2 representing a small effect size, 0.5 a moderate effect size, and 0.8 a large effect size (Cohen, 1988). T-scores were calculated to show the difference between the student population before and after the intervention.

Table 2 details how students felt that they completed the intervention knowing how to source for more relevant information and how to create more appealing slides to aid their speech. However, the students need more guidance with the texture structure and language features of a speech before they are able to be more confident of their knowledge. Also, it is clear that the students require to develop more self-awareness and better self-monitoring to ascertain their own progress from the question "I feel confident presenting after having lots of practice".

Table 2: T-scores, P-value and Effect Sizes for various modules

Module	Tertiary Writing Skills		Presentation Skills	
Questions from the pre- and post-intervention questionnaires	I know how to find relevant information from various sources (e.g. internet, newspapers & books, etc.).	I know the structure and language features of a speech.	I feel confident presenting after a lot of practice.	I know how to create appealing visual aids (i.e. Google Slides) to help me in my presentation
T-scores	0.04	0.91	0.06	0.01
P-value interpretation	*	nil	nil	**
Effect sizes	0.54 moderate	0.03 -	0.44 small	0.61 moderate
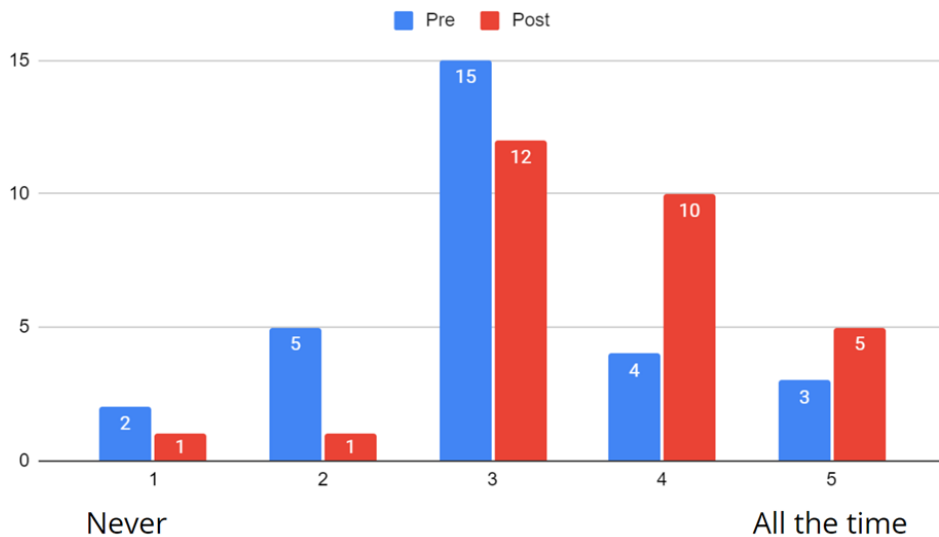
Figure 8: Students' perceptions of their ability to search for information to write a speech before and after the intervention

Although there were a high number of students who felt neutral about their research skills before the intervention, more students confidently chose the option that they were able to find relevant information "all the time" after having gone through the intervention. Students may have chosen more neutral options initially as research is a relatively new area of learning for them. They may not have known the steps such as defining search terms and verifying the validity and reliability of sources. Hence more students chose scores "4" and "5" in the post-survey which indicates their improved self-perception of their ability to search for relevant information to write a speech.

The students also improved in their knowledge of the text structure and language features of a speech after the intervention with a positive trend (Figure 9).
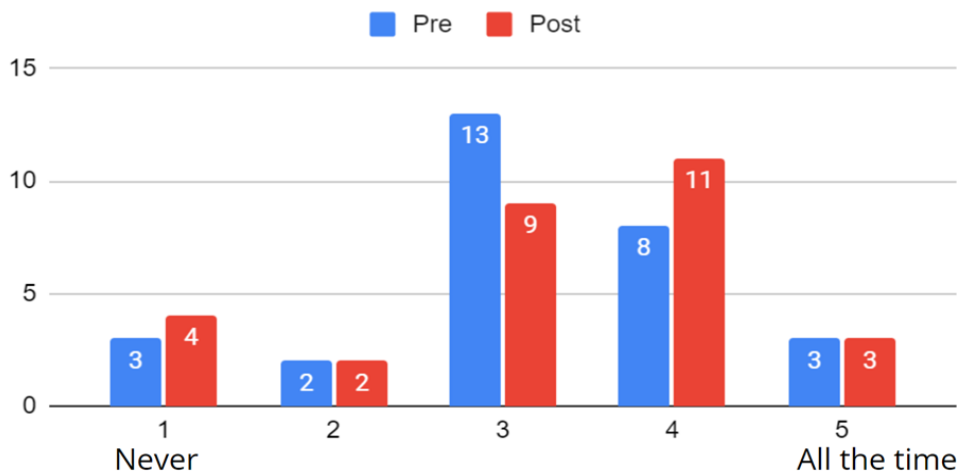
Figure 9: Students' perceptions of their ability to write a speech before and after the intervention

A higher number of students felt more confident presenting after a lot of practice during the intervention (Figure 10) . The student who rated his confidence level as 1 before, rated his confidence level as 5 after the programme. This was a student from IHL, diagnosed with dyslexia and observed to have several comorbidities. His teacher described him as someone who needed one-to-one intervention, and that he was passionate about his presentation topic, leading to him becoming more motivated in putting together his thoughts and creating engaging slides for the final presentation.

I feel confident presenting after a lot of practice
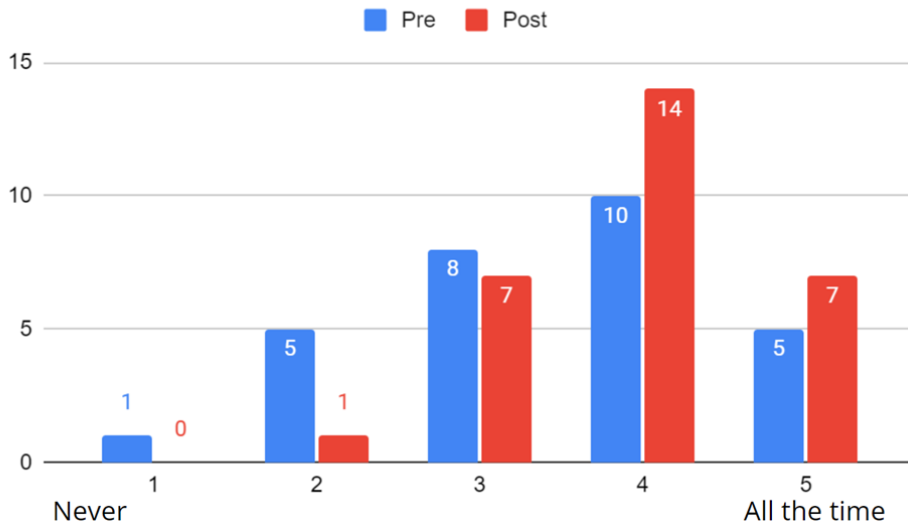
Figure 10: Students' perceptions of their confidence when presenting before and after the intervention

I know how to create appealing visual aids (e.g. Google Slides) to help me in my presentation
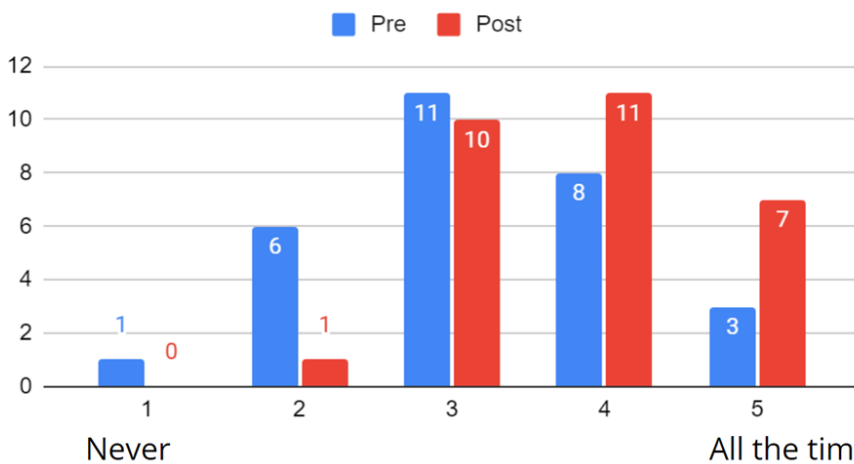
Figure 11: Students' perceptions of their ability to create slides before and after the intervention
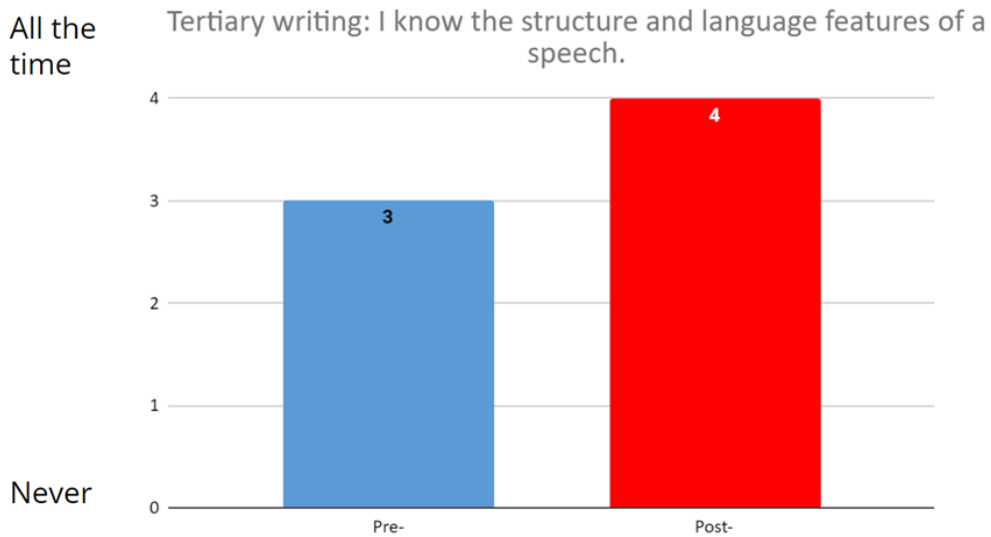
Figure 12: Student H's self-awareness of his speech-writing skills
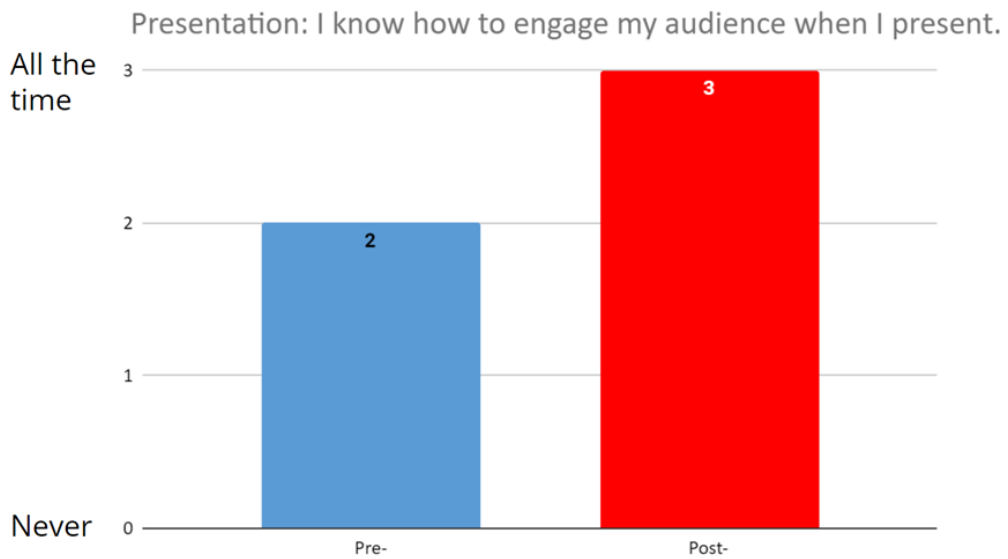
Figure 13: Student H's self-awareness of his presentation skills

The student who rated his confidence level as 3 before the programme, and as 2 after the programme was a student from the Institute of Higher Learning as well. His teacher described him as having a busy schedule due to his school and part-time work commitments. His busy schedule meant he could not complete his assignments on time . This may have affected his confidence.

Most of the students also learnt how to create appealing visual aids (e.g. Google slides) to help them in their presentations after the intervention.

During the six-months post-interview conducted with Student H, the non-diagnosed struggling learner, he shared his thoughts on the speech-writing and presentation skills while going through the intervention.

Student H also shared in the pre-survey and post-survey that he improved in his knowledge of the structure and language features of a speech (Figure 12).

Student H also noted that he improved in knowing how to engage the audience when presenting (Figure 13).

Student H also shared the following::

> **Speech-writing:** *"For organisation, Trello, you all taught, quite useful to use, it helped me to manage all the different information I had in my project."*

> **Presentation:** *"A very good course, it cover topic on how to do research…to present…"*

Teacher observation of student H:

> *" H was always enthusiastic about learning and doing his best during lessons. He was not able to express his thoughts clearly and often felt limited by it. However, he could complete his assignments on time management and organisation, planning and organisation, tertiary writing (speech) and presentation with my guidance delivered in various forms such as verbal prompts, demonstrations, videos, chatbox and normative feedback."*

The students' responses in the pre-survey need to be considered in light of their self-perception. Before the pre-survey, students may not be clear about how well they know what is required in reality when it comes to speech-writing and presenting. Students may have underestimated or overestimated themselves when answering the pre-survey questions. After going through the real-life scenario of preparing a speech and delivering it, they would have gained greater self-awareness and self-esteem and become more aware of what skills they have.

RQ3: Is there a difference in terms of pedagogical instruction between Secondary School learners and IHL learners in the areas of speech writing and presentation skills?

The teachers of the programme have shared in the teacher questionnaire about how they manage their students and the varying levels of needs for the different profiles. One of the teachers shared that

> *"it depends on the level of the students… as (some) IHL students may have more experience in writing a speech as compared to the secondary school students, the depth in (the explanation of) how to write a speech to a student more unfamiliar with speech writing will be slightly deeper."*

Similarly, another teacher shared her thoughts on varying the mode of instruction for her students, stating that

> *"I usually differentiate by showing more videos, demonstrations and presentation-feedback for IHL students… allowing engagement with multi-sensory elements. For secondary school students who are more used to receiving verbal instructions from their teachers, I use more verbal instructions, illustrations and assignment feedback."*

The results in the effectiveness of differentiating instructions for students of varying levels (across school levels and within school levels) are also seen in the work produced. The first secondary school student shown in the example required more help in ideas generation, and hence, his teacher met with him separately to help him brainstorm more ideas that he wanted to add to his brainstorming assignment. With additional promptings and guidance with his research, he also managed to fill in the writing organiser with more substantial information.

Another secondary school student in the same cohort required more help in terms of organising the flow of his ideas, as idea generation was not an issue for him. With guidance from his teacher, he was able to whittle down to the points that were relevant and followed a more logical flow. (See Figure 15)

After comparing the differentiated instructions for students, we found the learning needs of students to be similar. However, the difference was in terms of the input the teachers needed to give. This student from IHL required slightly more help in the research and prompts to add more content to her speech, which is similar to the first secondary school student. However, she managed to do so, with fewer prompts as compared to the prompts required for secondary school students.

Table 3: Secondary student 1's initial brainstorming work with additional guidance from his teacher (in black)

My Research Topic	Is gaming good for the body
What is the problem/issue?	Most parents say that gaming is bad for the body and the mind.
Why and How did this problem arise?	When I was gaming Why are parents concerned about gaming - Violent video gameplay was linked to increased aggression in players, but there's no link between playing violent videos games and criminal violence. - Students or children spend too much time playing games until they forget to do their work—chores and study
Where/When did it happen?	All around the world
How was it before?	Bad
How is it now/	Bad
What should it be?	Good. https://edition.cnn.com/2020/11/16/health/video-games-mental-health-study-wellness-scli-intl
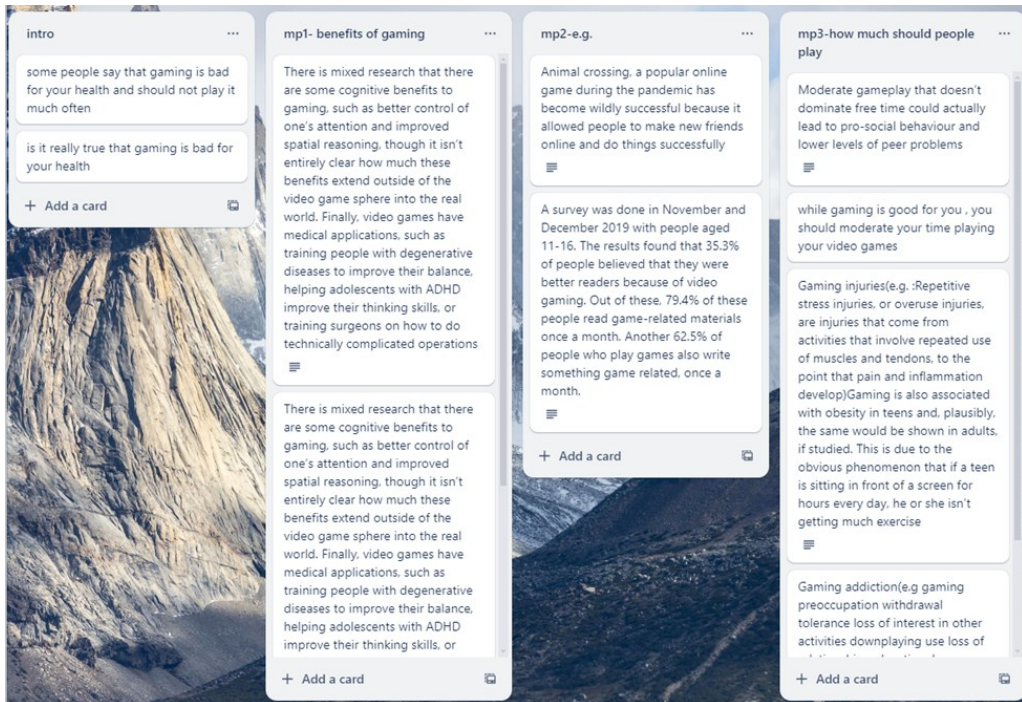
Figure 14: Secondary school student 1's filled in work, with further prompting and help with research

My Research Topic	Environment (inform)
What is the problem/issue? **Can you give some examples of some animals?**	How some animals remained unchanged after millions of years fish found on the coast of Madagascar coelacanth and the alligator
Why and How did this problem arise? **Why don't thes animals need to change? And what was the stimulus (trigger or thing around them) that should have made them change?**	They did not need to change their ways in order to survive Sometimes some animals may need to adapt to the new conditions around them, but some animals already have what they need
Where/When did it happen?	Over 120 million years ago
How was it before? **Based on the animals given above can you describe some featherus they have?**	They look similar to how they do today

Figure 15: Secondary School student 2's initial brainstorming assignment with teacher's prompts in red.
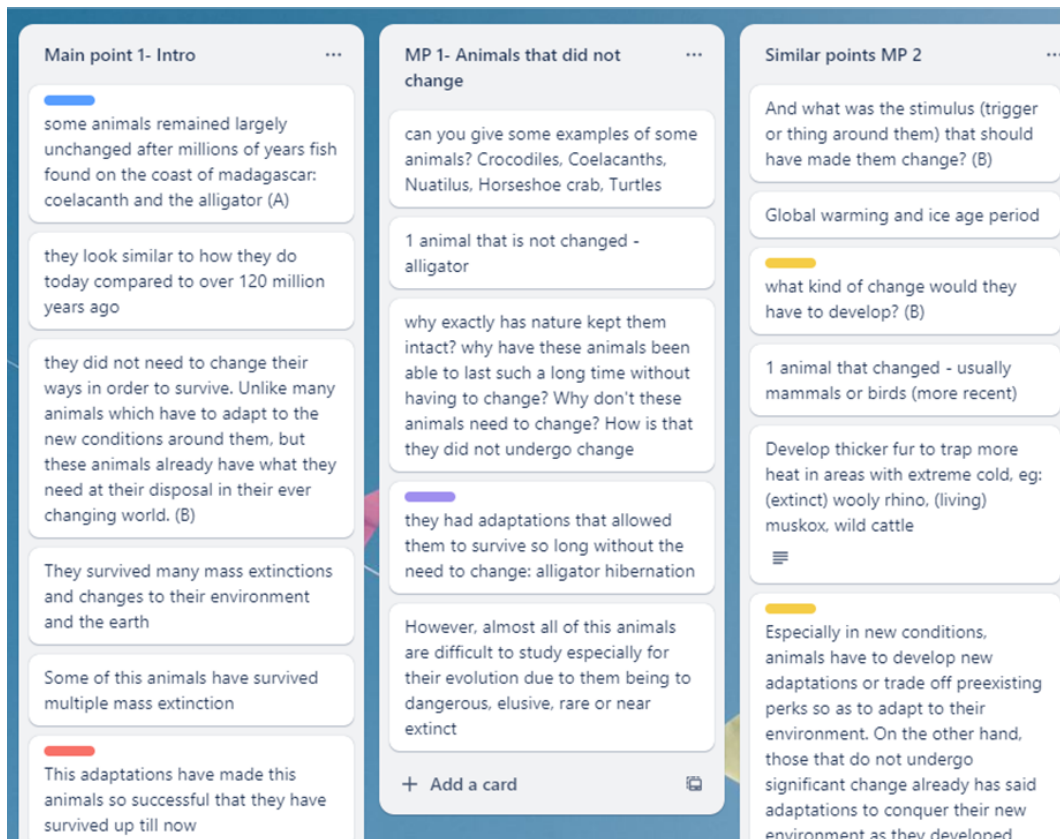
Figure 16: Secondary School student 2's writing organiser filled in with help in the organisation of his ideas

My Research Topic	Sleep (motivate)
What is the problem/issue?	People not getting enough sleep
Why and How did this problem arise?	Why poor sleep hygiene, lifestyle choices, work obligations, sleep disorders, and other medical conditions How—people with multiple jobs or other responsibilities
Where/when did it happen?	When—early 1990 **Where—Any napping area (bed/sofa/table)**
How was it before?	They were able to get their task done without getting tired
How is it now?	**People are not able to finish their work and most of them drink energy drinks to help them stay awake.**
What should it be?	Not a need for energy drinks need good sleeping cycle

Figure 17: IHL student's brainstorming assignment, with inputs from the facilitator

Figure 18: IHL student's writing organiser filled in, with prompts for research given by the facilitator

CONCLUSION

Overall, positive results were observed among students, teachers and parents. More self-monitoring, awareness and self-confidence needs to be gathered before the students know their progress made during the course of the intervention in the areas of writing and presentation skills this is similar to Hewes's (2020) study whereby even though the participants made progress, they may not be aware due to years of negative experiences. This may also suggest that students who have SEN and who learn differently like Student H might also need more help with writing and presentation skills. Nevertheless, perceptions from the teachers have been favourable. This is evident from the teachers' perspectives where teachers have observed positive changes in their students' attitudes and confidence, independence levels, self-monitoring and self-directedness.

It was also apparent that after analysing the students' work and the interactions with the students that instructions, regardless of whether they are from IHL or secondary school, were based on the learning needs of the students rather than the educational institution they are currently studying at. Teachers also needed to thoroughly understand the students' learning needs. For instance, the teachers would need to look at each student's pre-intervention survey results to thoroughly understand their students' learning needs before guiding the student such as looking at each student's pre-intervention survey, parent's input, class observations, weekly check-ins, observations during online consultations.

Therefore, after a 20-week intervention on the various areas of executive function, writing and presentation skills, it was found that an online programme using pedagogical principles such as the OG principles and UDL principles, computer-mediated learning and in small class sizes will help students with SEN and without a diagnosis in the areas of speech-writing and presentation skills.

LIMITATIONS AND FUTURE RESEARCH

Research findings from this study have shown that the students are unaware of the progress they have made while and after attending the programme and there may be several reasons that contribute to this.

Firstly, there may be a lack of opportunities to demonstrate and practice the skills taught on iSS and in school due to the short intervention time as not all of the 20 weeks were devoted to just writing and presentation skills and the majority of the time was spent getting them prepared for their speech and presentation. Therefore, some of the students might have difficulties applying and transferring the taught skills to their school environment. It would be good for the intervention period to be longer for the speech-

writing and presentation skills so that the students can demonstrate the skills learnt to another similar assignment while on the intervention programme.

Next, a limited meta-awareness of their current skills or ability may influence how they think they are progressing and this may affect how they view themselves and the intervention programme. Students will need to feel success on the programme before they feel confident to progress further or even apply the skills learnt.

As the sample size was determined based on the cohort, more studies need to be done by reviewing and monitoring the trends and observations with incoming batches of students. Also, there was only an experimental group, no control group, that consists of upper secondary and IHL students who have been enrolled on iSS. Hence, a comparison could not be made between the different groups to see if any positive effects were due to other confounding factors.

To counteract some of the limitations described above, future research can be explored by changing the intervention to just to focus solely on writing and presentation skills, to further study the effects of the targeted skills.

As the students have limited metacognition of their own ability, it may be useful to include constructive teacher feedback influences students' progress and how metacognition may be improved by providing more communicative feedback by more communicative feedback through the intervention with the introduction of different judging criteria for writing speeches and presentations.

At the same time, it may be worthwhile to study the differences between two different groups of students (control and experimental) to see whether any effects is the result of the intervention and not the presence of other external variables.

Another post-intervention study that could be conducted would be to see how stable the improvements made by the students remain after they completed the programme. The study could look at whether the students continued to feel positive about themselves and their writing and presentation skills or if they have regressed in any areas. This study may be hindered by the lack of student responses, which can happen once they complete the programme.

REFERENCES

Al-Otaibi, W. H. (2017). The Effectiveness of Blackboard-Based Blended Teaching in the Development of Academic Achievement, Study Skills and Self-Confidence among Students of Princess Nourah bint Abdulrahman University. *International Education Studies, 10* (11), 100-115.

Andreou, E., & Vlachos, F. (2013). Learning styles of typical readers and dyslexic adolescents. *Journal of Visual Literacy, 32* (2), 1-14.

Booth, J. N., Boyle, J. M., & Kelly, S. W. (2010). Do tasks make a difference? Accounting for heterogeneity of performance of children with reading difficulties on tasks of executive function: Findings from a meta-analysis. *British Journal of Developmental Psychology, 28* (1), 133-176.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*, 77–101. doi:10.1191/1478088706qp063oa

Carlisle, D. D. (2022a). Disability support for students with special educational needs at institutes of higher learning in Singapore: A historical perspective to developments in education policy. *Disability and the Global South, 9* (1), 2130-2151.

Carlisle, D. (2022b). See me, hear me: Successes and challenges of students with invisible disabilities at university in Singapore. *Asia Pacific Journal of Developmental Differences, 9* (1), 119-142.

Chou, C. P., Chen, K. W., & Hung, C. J. (2021). A Study on Flipped Learning Concerning Learning Motivation and Learning Attitude in Language Learning. *Frontiers in Psychology, 12*, 1-5, https://doi.org/10.3389/fpsyg.2021.753463.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* Hillsdale, NJ: Lawrence Erlbaum Associates. ISBN 978-1-134-74270-7.

Dewi, S. S., & Dalimunthe, H. A. (2019). The effectiveness of universal design for learning. *Journal of Social Science Studies, 6* (1), 112-123.

Dobson Waters, S., & Torgerson, C. J. (2021). Dyslexia in higher education: a systematic review of interventions used to promote learning. *Journal of Further and Higher Education, 45*(2), 226 -256.

Draffan, E. A., Evans, D. G., & Blenkhorn, P. (2007). Use of assistive technology by students with dyslexia in post-secondary education. *Disability and Rehabilitation: Assistive Technology, 2* (2), 105-116.

Dyslexia Association of Singapore. (2024). *What is dyslexia?.* https://das.org.sg/ learning_differently/understanding-dyslexia/

Dyslexia Association of Singapore. (2024). *Our Programmes.* https://das.org.sg/services/ programmes/main-literacy-programme/

European Dyslexia Association. (n.d.). *What is dyslexia?* https://eda-info.eu/what-is-dyslexia/

Griffin, E. & Pollak, D. (2009). Student experiences of neurodiversity in higher education: insights from the BRAINHE project. *Dyslexia, 15*(1), 2341.

Hall, T. E., Cohen, N., Vue, G., & Ganley, P. (2015). Addressing learning disabilities with UDL and technology: a Strategic reader. *Learning Disability Quarterly, 38*(2), 72-83. https:// doi.org/10.1177/0731948714544375

Hatcher, J., Snowling, M. J., & Griffiths, Y. M. (2002). Cognitive assessment of dyslexic students in higher education. *British journal of educational psychology, 72*(1), 119-133.

Hayes, J. R., & Berninger, V. (2010). Relationships between idea generation and transcription: How act of writing shapes what children write. In C. Brazerman, R. Krut, K. Lunsford, S.

McLeod, S. Null, P. Rogers, & A. Stansell, (Eds). *Traditions of Writing Research*. Taylor & Frances/Routledge; New York, NY: p. 166-180.

Heiman, T., & Precel, K. (2003). Students with Learning Disabilities in higher education: Academic strategies profile. *Journal of Learning Disabilities, 36*, 248–258.

Hewes, D. G. (2020). Entrepreneurs with dyslexia in Singapore: The incidence, their educational experiences, and their unique attributes. *Asia Pacific Journal of Developmental Differences, 7*(2), 157-198.

Higgins-Opitz, S. B., & Tufts, M. (2010). Student perceptions of the use of presentations as a method of learning endocrine and gastrointestinal pathophysiology. *Advanced Physiology Education, 34*, 75–85.

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

Hunt, S. K., Simonds, C. J., & Simonds, B. K. (2009). Uniquely qualified, distinctively competent: Delivering 21st century skills in the basic course. *Basic Communication Course Annual, 21*(1), 6.

Jeffries, S., & Everatt, J. (2004). Working memory: Its Role in Dyslexia and Other Specific Learning Difficulties. *Dyslexia, 10*, 196–214.

Johnson-Harris, K., & Mundschenk N. (2014). Working effectively with students with BD in general education classroom: The case for universal design for learning. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 87*, 168–174. https://doi.org/10.1080/00098655.2014.897927

Khan, A. (2014). An investigation into prospective memory in children with developmental dyslexia. *Frontiers in Psychology, 5*, 1308.

Katz, J., & Sokal, L. (2016). Universal design for learning as a bridge to inclusion: A qualitative report of student voices. *International journal of whole schooling, 12*(2), 36-63.

Kirby, J. R., Silvestri, R., Allingham, B. H., Parrila, R., & La Fave, C. B. (2008). Learning strategies and study approaches of postsecondary students with dyslexia. *Journal of Learning Disabilities, 41*(1), 85–96.

Knight, V. F., Spooner, F., Browder, D. M., Smith, B. R., & Wood, C. L. (2013). Using systematic instruction and graphic organizers to teach science concepts to students with autism spectrum disorders and intellectual disability. *Focus on Autism and Other Developmental Disabilities, 28*(2), 115-126. https://doi.org/10.1177/1088357612475301

Learning Disabilities Association of Minnesota. (n.d.). *What are some characteristics of LD in Adults?.* https://www.dhs.state.mn.us/main/groups/agencywide/documents/defaultcolumns/Dhs-291025.pdf

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.

Meltzer, L. (2012). Problem-solving strategies and academic performance in learning disabled students: Do Subtypes Exist? In L. V. Short, E. J. Meltzer, L. J. (Eds.) *Subtypes of Learning Disabilities: Theoretical Perspectives and Research,* Feagans, Lawrence Erlbaum Associates: Hillsdale, NJ, USA, 1991; pp. 163–188.

Mavrou, K., Charalampous, E., & Michaelides, M. (2013). Graphic symbols for all: Using symbols in developing the ability of questioning in young children. *Journal of Assistive Technologies, 7*(1), 22-33. https://doi.org/10.1108/17549451311313192

Ministry of Education, Singapore. (2023, January 25). *Special educational needs support at Institutes of Higher Learning.* https://www.moe.gov.sg/special-educational-needs/school-support/ihl

Moats, L. (2019). Structured literacy: Effective instruction for students with dyslexia and related reading difficulties. *Perspectives on Language and Literacy, 45*(2), 9-11.

Mortimore, T., & Crozier, W. (2006). Dyslexia and difficulties with study skills in higher education. *Studies in Higher Education, 31*, 235–251. doi:10.1080/03075070600572173

Nash, G., Crimmins, G., & Oprescu, F. (2016). If First-year Students are Afraid of Public Speaking Assessments What Can Teachers Do to Alleviate Such Anxiety? *Assessment & Evaluation in Higher Education 41*(4), 586–600. doi:https://doi.org/10.1080/02602938.2015.1032212.

Nicholl, B., Flutter J., Hosking I., & Clarkson P. (2013). Transforming practice in design and technology: Evidence from a classroom-based research study of students' responses to an intervention on inclusive design. *The Curriculum Journal, 24*(1), 86–102. https://doi.org/10.1080/09585176.2012.744696

Nouri, J. (2016). The flipped classroom: for active, effective and increased learning–especially for low achievers. *International Journal of Educational Technology in Higher Education, 13*(1), 1-10.

Olofsson, Å., Ahl, A., & Taube, K. (2012). Learning and study strategies in university students with dyslexia: Implications for teaching. *Procedia Social and Behavioural Sciences, 47*, 1184–1193. doi:10.1016/j.sbspro.2012.06.798.

Olofsson, Å., Taube, K., & Ahl, A. (2015). Academic achievement of university students with dyslexia. *Dyslexia, 21*(4), 338-349. doi:10.1002/dys.1517

Peltier, T. K., Heddy, B. C., & Peltier, C. (2022). What do teachers know about dyslexia? It's complicated. *Reading and Writing, 35*, 2077–2107. https://doi.org/10.1007/s11145-022-10264-8

Pino, M., & Mortari, L. (2014). The inclusion of students with dyslexia in higher education: A systematic review using narrative synthesis. *Dyslexia, 20*, 346–369. doi:10.1002/dys.1484

Pugh, K. R., Frost, S. J., Sandak, R., Gillis, M., Moore, D., Jenner, A. R., & Mencl, W. E. (2006). What Does Reading Have to Tell Us about Writing?: Preliminary Questions and Methodological Challenges in Examining the Neurobiological Foundations of Writing and Writing Disabilities. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 433–448). The Guilford Press.

Ramus, F., Rosen, S., Dakin, S. C., Day, B. L., Castellote, J. M., White, S., & Frith, U. (2003). Theories of developmental dyslexia: insights from a multiple case study of dyslexic adults. *Brain, 126*, 841-865.

Rembach, O., Liubych, O., Antonenko, M., Kovalenko, V., & Valieiev, R. (2019). University Students` Satisfaction: The Impact of Computer-mediated Blended Learning. *Revista Românească Pentru Educație Multidimensională, XI*(4 Sup1), 221–241. https://doi.org/10.18662/rrem/186

Research Collaboration. (2015). *Self-Efficacy Formative Questionnaire Technical Report*. http://www.researchcollaboration.org/uploads/Self-EfficacyQuestionnaireInfo.pdf.

Rose, J. (2009). *Identifying and Teaching Children and Young People with Dyslexia and Literacy Difficulties.* Nottingham: DCSF Publications.

Roselló, B., Berenguer, C., Baixauli, I., Mira, Á., Martinez-Raga, J., & Miranda, A. (2020). Empirical examination of executive functioning, ADHD associated behaviors, and functional impairments in adults with persistent ADHD, remitted ADHD, and without ADHD. BMC *psychiatry, 20*, 1-12.

Smith-Spark, J. H., & Gordon, R. (2022). Automaticity and executive abilities in developmental dyslexia: A theoretical review. *Brain Sciences, 12*(4), 446. https://doi.org/10.3390/brainsci12040446

Smith-Spark, J. H., & Lewis, E. G. (2023). Lived Experiences of Everyday Memory in Adults with Dyslexia: A Thematic Analysis. *Behavioral Sciences, 13*(10), 840.

Smith-Spark, J. H., Zięcik, A. P., & Sterling, C. (2017). Adults with developmental dyslexia show selective impairments in time-based and self-initiated prospective memory: Self-report and clinical evidence. *Research in Developmental Disabilities, 62*, 247-258.

Sparks, R. L., & Lovett, B. J. (2009). College students with learning disability diagnoses: Who are they and how do they perform? *Journal of Learning Disability, 42*, 494–510. http://dx.doi.org/10.1177/0022219409338746

Stanton, R. (2019). Dyslexia and oral skills: A student's journey. *ATLAANZ Journal. 4*, 57-72. https://doi.org/10.26473/ATLAANZ.2019.1/004

Stebbings, J. A., & Kline, E. (2020). Academic and cognitive remediation for students with learning disabilities: A comparison between Orton Gillingham and NILD educational therapy. *IJRLD-International Journal for Research in Learning Disabilities, 4*(2), 15-34.

Tam, I. O., & Leung, C. (2019). Evaluation of the effectiveness of a literacy intervention programme on enhancing learning outcomes for secondary students with dyslexia in Hong Kong. *Dyslexia, 25*(3), 296-317.

Texas Education Agency (2022). *Texas Academy Performance Report.* https://tea.texas.gov/texas-schools/accountability/academic-accountability/performance-reporting/school-report-cards

Tops, W., Callens, C., Van Cauwenberghe, E., Adriaens, J., & Brysbaert, M. (2013). Beyond spelling: the writing skills of students with dyslexia in higher education. *Reading and Writing, 26,* 705-720.

Tops, W., Jansen, D., Ceulemans, E., Petry, K., Hilton, N. H., & Baeyens, D. (2023). Participation problems and effective accommodations in students with dyslexia in higher education. *European Journal of Special Needs Education, 38*(3), 317-333.

Townes, P., Liu, C., Panesar, P., Devoe, D., Lee, S. Y., Taylor, G., ... & Schachar, R. (2023). Do ASD and ADHD have distinct executive function deficits? A systematic review and meta-analysis of direct comparison studies. *Journal of Attention Disorders, 27*(14), 1571-1582.

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).

West, T. G. (2014). Amazing Shortcomings, Amazing Strengths – Beginning to Understand the Hidden Talents of Dyslexics, *Asia Pacific Journal of Developmental Differences, 1*(1) pp. 78-89.

ACKNOWLEDGEMENTS

On behalf of the entire team, we would like to give our deepest appreciation firstly to the Lim Hoon Foundation who have kindly provided grants and bursaries to students who are currently studying in Institutes of Higher Learning (IHLs) and in need of financial support. Without their generous contribution, the Dyslexia Association of Singapore (DAS) would not have been able to reach out to so many students in need of help to transition better in IHLs.

Secondly, we would like to give our deepest thanks to Dr Angela Fawcett, DAS research advisor for her immense guidance, advice and encouragement. We would also like to give a special thanks to Dr Geetha Shantha Ram, Director of the DAS English Language and Literacy Division, as well as Serena Abdullah, Deputy Director of ELL Division.

Thirdly, we are also grateful to our external consultant who was invaluable when giving feedback to improve the iStudySmart programme, Dr Shanti Isabelle Benjamin, DAS colleague, Soofrina Mubarak, who has been instrumental in designing and creating the e-learning packages and managing the learning management system, Melody Chang, who was part of the iStudySmart team and an critical team member who has since left the organisation, Melcher Tan, who also contributed to writing the report as a contributing member.

Fourthly, we are also thankful to the parents who worked with us during the course of the intervention and gave us their consent for their child to be part of this research, and the students who took part in our evaluation so that this study could be used to further improve the programme for other students in the future.

Lastly, we would like to thank our family as we would not be able to persevere to finish this paper without their encouragement and support.

Orthographic awareness and its relationship to Chinese word reading and spelling in young bilingual learners with Chinese reading difficulties in Singapore

Yun Rui Kong[1], Catherine Chunhong Ni[1*], Chien Ling Loo[1] and Dongbo Zhang[2]

1.   Dyslexia Association of Singapore
2.   Graduate School of Education, University of Exeter, the United Kingdom

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 structural and functional OA. This study also aimed to evaluate the relationship between the two facets of OA and word reading and spelling in typically developing (TD) learners and learners with Chinese RDs. 218 bilingual TD learners from Grade 3 to 5 and 513 bilingual learners with Chinese RDs from Grade 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 emphasised 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

* Correspondence to:
Catherine Chunhong Ni, Dyslexia Association Singapore, Email: catherine.ni@das.org.sg
ORCID number: 0009-0009-3747-5150

INTRODUCTION

Learners with reading difficulties (RDs) typically show reading performance significantly below expected levels and low literacy achievement, given their normal intelligence levels (Swanson et al., 2013). Crosslinguistic studies on monolingual children showed that the underpinning cognitive deficits of RDs vary from language to language. In the literature on children with Chinese RDs and that on developing readers of Chinese in general, orthographic awareness (OA) – a learner's insights into the orthographic rules of Chinese characters (Wei et al., 2014) – has been particularly underscored (Lam & Tsui, 2013; Tong et al., 2019; Wong, 2020). Nevertheless, the issue has been investigated predominantly with native Chinese-speaking children in societies such as Mainland China, Taiwan, and Hong Kong. Many issues related to OA, reading, and spelling remain to be understood in bilingual learners of Chinese, for whom Chinese may not be their home language and primary literacy. How may OA characterise RDs in those bilingual learners? How may different aspects of OA contribute to Chinese literacy in bilingual learners with or without RDs?

The present study aimed to fill this gap by comparing the English-Chinese bilingual learners of Chinese with RDs and those typically developing Chinese learners (hereafter, TD learners) in Singapore. Singapore is a multilingual society with a bilingual education policy that mandates all children to be schooled in English and study a mother tongue as a second language. Singapore thus presents a unique socio-educational context of Chinese literacy learning compared to other Chinese societies (Cheung & Ng, 2003). This study measured two facets of Chinese OA (structural and functional OA) and compared them in bilingual TD learners and learners with Chinese RDs at different grades in elementary schools in Singapore. It also compared the relative importance of those two OA facets in predicting Chinese word reading and spelling among those learners.

Orthographic awareness and its importance in Chinese literacy acquisition

Chinese is a morphosyllabic language where a syllable is mapped onto a character (logograph), and each character comprises different strokes, stroke patterns, and orthographic units. More than 80% of Chinese characters are compound units comprising two or more orthographic units (DeFrancis, 1989; Kang, 1993). The different orthographic units can be organized differently with a fixed set of typographic configurations such as top-down and left-right, half-circle, full-circle, up-left, up-right, etc. (Dai et al., 2007; Lin et al., 2019). The Chinese writing system and orthography properties suggest that OA is important when learning Chinese.

Orthographic skills and knowledge are particularly important in learning Chinese, more so than alphabetic language. Unlike English, Chinese is a language in which the character's pronunciation cannot be readily retrieved from the character's writing. Scholars commonly recognise OA as an essential skill that supports learners of Chinese

to form connections between orthography, semantics, and phonology of Chinese characters and subsequently leads to the acquisition of reading and writing skills (Chan et al., 2006; Tan et al., 2005; Zhang, 2017a, 2017b).

According to Wei et al. (2014), OA is the understanding of the orthographic rules of Chinese characters, including the legality of its parts, namely, stroke, radical, and component, and the knowledge of their positional and functional regularities. Based on this definition, OA entails different types and levels of insights into the orthographical features of Chinese characters, and it may be broken down into two broad facets: structural and functional OA. Structural OA refers to basic understanding related to the strokes within the character, the stroke order, and the orientation and placement of the components of a character (Leong & Ho, 2012). On the other hand, functional OA refers to the understanding and knowledge related to the functional components of Chinese characters (e.g., semantic radicals and phonetic radicals) that contribute to character learning.

The orthographic developmental theory proposed by Ho et al. (2003) suggests the development of orthographic knowledge follows this sequence: character configuration knowledge, structural knowledge, radical information knowledge, positional knowledge, functional knowledge, amalgamation, and complete orthographic knowledge. Many subsequent research findings support the development sequence of orthographic awareness. Qian et al. (2015) suggested that children as young as three demonstrated some ability to determine the legality of Chinese characters. By age five, they were able to identify missing or rotated parts within a character. However, their functional OA remained limited. Tong et al. (2017) examined the development of positional, phonetic, and semantic cues of radicals in learners from kindergarten to elementary two and elementary five. The researchers concluded that there was a shift from a structural-based focus to a functional-based focus in learning Chinese at later ages. In the current study, it is hypothesised that the development of structural OA is ahead of the development of functional OA.

Previous studies investigated the relationship between OA and Chinese literacy competency and found the awareness of radical function essential for Chinese literacy development. Ho et al.'s study (2003) revealed that processing radical information, position, and function strongly correlated with Chinese word-reading, sentence-reading comprehension, and word spelling. Other studies found that students who successfully accessed semantic and phonetic radical knowledge showed improvements in reading skills, including word reading and reading comprehension (Cheung et al., 2007; Yeung et al., 2011). In another study, children were taught explicitly how to break down the components of characters and explained that radicals within a character provided information either as the meaning or the pronunciation of the character. As a result, an improvement in the children's ability to write characters and spelling was observed

(Packard et al., 2006). However, these findings largely came from studies on monolingual Chinese-speaking children.

Despite the importance of OA in Chinese literacy development, studies that examine OA on a deeper level, such as differentiating structural and functional OA remained limited. Studies on OA in bilingual learners acquiring biliteracy are even fewer. It is vital that OA is examined in greater depth by examining its structural and functional aspects and how they differentially contribute to Chinese word reading and spelling across elementary grades in the English-Chinese bilingual context of Singapore.

The impairment of orthographic awareness and Chinese reading difficulties

Chinese children with RDs have deficits in a wide range of cognitive and linguistic skills. These children have deficits in morphological awareness, orthographic knowledge, phonological awareness, rapid naming, working memory, and visual skills and moderate deficits in short-term memory and motor skills compared to age-matched typically developing children (Peng et al., 2017).

Growing evidence supports that OA deficit is a significant cause of reading difficulties in Chinese. OA is a primary deficit factor alongside the other multiple cognitive deficits in learners with Chinese RDs. Lin et al.'s study (2020) revealed that learners with dyslexia performed significantly poorer in OA tasks, such as non-character recognition and component recognition, than peers without dyslexia. Similarly, in Ho et al.'s study (2002), learners with dyslexia performed poorer in orthographic tasks such as identifying characters with incorrect orientation, identifying non-characters, and indicating the legal position of radicals.

These studies were nevertheless limited in that while they focused on OA and literacy in children with Chinese RDs, given that OA progresses developmentally and in complexity, they rarely explored how different facets of OA may impact Chinese literacy acquisition differentially across different stages of elementary schooling. Moreover, they did not investigate how the pattern of influence may differ between children with Chinese RDs and their TD peers. In addition, most of these studies were based on monolingual Chinese learners with Chinese RDs.

Research Questions

This study examined the development of two facets of OA (structural and functional) in bilingual TD learners of Chinese and bilingual learners with Chinese RDs in Singapore. It also investigated the relationship between the two facets of OA with two Chinese literacy competencies, namely, word reading and spelling. The following two research questions guided the study.

1. Are there developmental differences in the two facets of OA (structural and functional) in bilingual TD learners and learners with Chinese RDs?

2. Do structural and functional facets of OA differentially predict Chinese word reading and spelling across elementary grade levels in bilingual TD learners and learners with Chinese RDs?

MATERIALS AND METHOD

Participants

Participants included two groups of elementary school English-Chinese bilingual learners of Chinese in Singapore: learners with RDs and TD learners. Following the bilingual education policy in Singapore, both groups received formal literacy instruction in both Chinese and English in mainstream schools; yet they showed contrasting reading development profiles.

The group with Chinese RDs consisted of 513 children who were identified by their mainstream schools as struggling with reading in Chinese and were thus referred to DAS for extra-curricular Chinese literacy support provided by specialists there. Chinese language teachers in mainstream schools reported that those children's Chinese language achievement was below grade level despite receiving remedial instruction at school. Parents also reported learning difficulties in Chinese, such as difficulties preparing for the spelling test and needing extra support from private Chinese tuition services. Concomitantly, those children were diagnosed as having dyslexia (in English) by educational psychologists using standardized English literacy assessments in Singapore. Formal diagnosis of Chinese reading difficulties, however, was not conducted by educational psychologists due to the lack of similar standardized Chinese literacy assessments in the country. For all children, IQ was within the normal range. About 5% (N = 35) had other accompanying learning-related difficulties, such as attention deficit and hyperactivity disorder. None had any sensory or neurological disorders.

Those children comprised 62.4% male (*N* = 320) and 37.6% female (*N* = 193). They were predominantly (96.1%) Chinese ethnicity, while the rest were of Eurasian, Indian, Malay, Filipino, or other ethnicities. In the Singapore public education system, elementary schools are referred to as primary schools, which include six years of education from Primary 1 to 6 (or Grade 1 to 6). Of the 513 children, 99, 102, 128, 89, 62, and 33 were in Grades 1 to 6, respectively. Their age at the date of the assessments described below was between 6.13 years and 12.94 years (*M* = 9.00, *SD* = 1.50).

For comparison purposes, data was also drawn from a group of TD learners (*N* = 128) who participated in a previous study in Singapore. Those elementary school students were not reported to experience reading difficulties in Chinese; neither were they

diagnosed to have dyslexia in English or reported to have any learning difficulty in school. They comprised 62 females and 66 males. Participants were from three grades: Grade 3 (N = 42), Grade 4 (N = 42), and Grade 5 (N = 44); and their ages ranged from 8.83 to 12 years old (M = 10.38, SD = 0.84). Data was not collected for children in Grades 1, 2, and 6 in that study. All participants were of Chinese ethnicity.

Assessments and procedure

All tests described below, including orthographic awareness, word reading, and word spelling, were adopted from Tan et al.'s (2018) Chinese Literacy Assessment tool, previously validated for Singapore school learners. Learners with Chinese RDs were assessed between October 2017 and November 2021, whereas TD learners were assessed between August 2016 and October 2016. During the different data collection periods for the two groups, two Chinese language curriculums (or the national curriculum for Chinese) were implemented: the Chinese Language Syllabus for Primary Schools 2007 and 2015. The two curriculums, however, were broadly similar in learning goals for the skills assessed in the participants for the present study (MOE, 2015).

The tests were administered individually to each participant by trained research assistants who underwent test administration and scoring training. For learners with Chinese RDs, about half (N = 265) were tested in a quiet room between October 2017 and February 2020; the other half (N = 248) were tested online between March 2020 and November 2021 due to the COVID-19 pandemic restrictions. In both data collection modes, the assessments were conducted in a one-to-one setting, with the assessor being able to interact and look at the child's response directly or through a live camera. None of the measures showed any significant difference between the two assessment conditions for any grade (i.e., 1-6), except functional OA for Grades 4 and 5 and word reading for Grade 5 (p < .05). This suggested that the influence, if any, of different assessment conditions, was very limited.

Orthographic awareness task

Orthographic awareness was evaluated using a character decision task (Tan et al., (2018). The task had 30 items, 19 non-characters as test items, and 11 real characters as filler items. The real characters were very low in frequency, so participants would unlikely have had prior exposure. Ten Chinese character structures, such as left-right (e.g., 扦), left-middle-right (e.g., 御), up-down (e.g., 宂), up-middle-down (e.g., 荛), left-down (e.g., 廷), up-left (e.g., 屏), enclosure (e.g., 囵), up-left-down (e.g., 匡), left-up-right (e.g., 夙), and left-down-right (e.g., 函) were covered (see Table 1).

The items assessing structural OA (n = 10) are non-characters with visual-spatial violations, such as a whole-character mirrored (e.g., 嘣) or a radical mirrored

Table 1. Violations of the non-characters in the orthographic awareness test

	Character Structure	Violation	Example
1	Left-right	Radical position	
		Radical mirror	
2	Left-middle-right	Character mirror	
		Radical position	
3	Up-down	Radical position	
		Radical mirror	
4	Up-middle-down	Radical position	
		Radical mirror	
5	Enclosure	Character mirror	
6	Up-left-down	Radical combinations	
		Radical mirror	
7	Left-down	Character mirror	
		Radical position	
8	Up-left	Radical combinations	
		Character mirror	
9	Left-down-right	Radical combinations	
		Character mirror	
10	Left-up-right	Radical mirror	

(e.g. 㷱). The items assessing functional OA (n = 9) are non-characters with either a violation of the positional or combination rules of functional components such as semantic radicals (e.g., 杅 and 匡). Participants were shown one item at a time and decided whether the item was a character or a non-character. The order of the test items was randomized for each participant. One point was awarded when the participant correctly identified a non-character. The raw scores were then converted to the percentage of correct responses for each facet. Tan et al. (2018) reported that the reliability of the overall OA test had a Cronbach's alpha of .643. In the current study, based on the data collected from the 513 learners with Chinese RDs, the structural and functional test items showed moderate or satisfactory internal consistency, with Cronbach's alpha being .740 and .623, respectively.

Word reading task

Word reading was measured with the word recognition task in Tan et al. (2018). The task had 100 test items selected from the Dictionary of Frequently Used Chinese Characters Encountered by Students in Singapore (Lin et al., 2014). Participants were asked to read aloud a Chinese character. For each correct character reading, a point was awarded. An example item and a trial item were administrated first to help students familiarise themselves with the test requirement. The task was stopped if the participants could not read seven consecutive characters. Participants only had 20 seconds to attempt each character. Tan et al. (2018) reported a Cronbach's alpha of .97 for this task. Independent samples t-tests showed that for all three grades (i.e., 3-5), the word reading scores of the learners with RDs were significantly lower than those of the TD learners (all ps < .001).

Word spelling task

The word spelling tasks had 50 two-character words arranged in order of increasing difficulty (Tan et al., 2018). The words were selected from the Dictionary of Frequently Used Chinese Vocabulary Words Encountered by Students in Singapore (Wu et al., 2013). Participants listened to the word being read out, followed by a sentence to provide context, and then the word again for clarity. They had 30 seconds to attempt each word. One point was awarded for each character spelled correctly, with a maximum of two points for each item. The test would stop if a participant consecutively scored 0 for seven items. In an earlier study by Tan et al. (2018), Cronbach's alpha for this task was .967. Independent samples t-tests showed that for all three grades, the spelling scores of the learners with RDs were significantly lower than those of the TD learners (all ps < .001).

Data analysis

To answer the first research question, three sets of ANOVAs were conducted. Two sets of 2 (OA facet) x 3 (grade) mixed ANOVAs were first performed for TD learners and learners with RDs, respectively. For TD learners, there were three grades (i.e., 4-6).

Learners with RDs from all grades were included but were regrouped into three stages of elementary schooling, namely lower elementary grades (Grade 1 and 2; N = 201), middle elementary grades (Grade 3 and 4; N = 217), and upper elementary grades (Grade 5 and 6; N = 95). A further 2 (OA facet) x 3 (grade) x 2 (learner type) three-way mixed ANOVA was subsequently carried out that aimed to additionally compare RDs and TD learners. For this ANOVA, only grades 3-5 were included for learners with RDs to match the grades available in the TD group.

To answer the second research question, a Pearson correlation analysis was first performed to assess the relationship between age, structural OA, functional OA, word reading, and word spelling in TD learners and learners with Chinese RDs. The correlation analysis was followed by a set of hierarchical multiple regression analyses to assess how structural and functional OA may distinctly predict word reading and spelling in TD learners and learners with Chinese RDs in different grades. In all hierarchical regression analyses, age was entered in the first step as the control variable, and structural OA and functional OA were subsequently entered as the second and the last step, respectively.

RESULTS

Comparing orthographic awareness

OA facets and TD learners in grade three to five

The means and standard deviations of different OA facets (as well as word reading and spelling scores) for the three grades of TD learners are shown in Table 2. Two-way ANOVA showed no statistically significant interaction between grade and facet of OA, $F(2, 125) = 0.121$, p =.886, partial η^2 = .002. The main effect of OA facets was not significant, $F(1, 125) = 3.37$, p = .069, partial η^2 = .026. The main effect of grades showed a statistically significant difference between the three grades, $F(2, 125) = 6.05$, p = .003, partial η^2 = .088. The Tukey post-hoc analysis showed that the OA of grade 5 learners was significantly higher than that of grade 3 (p = .005) and grade 4 (p = .020). However, the OA difference between grade 3 and 4 learners was not significant (p = .870).

OA facets and learners with RDs in lower, middle, and upper elementary grades

The means and standard deviations of different OA facets (as well as word reading and spelling scores) in the six grades and three grade levels (lower, middle, and upper elementary) are shown in Table 2. The two-way mixed ANOVA result showed no statistically significant interaction between elementary grade levels and OA facets, $F(2, 510) = 0.091$, p =.913, partial η^2 = .000. The main effect of OA facet was significant, $F(1, 510) = 150.28$, p < .001, partial η^2 = .228. It suggested that averaged across the three elementary grade levels, learners' functional OA scores were significantly lower than their structural OA scores. The main effect of elementary grade levels also showed

Table 2. The descriptive data of the two groups of learners: Typically developing learners and learners with Chinese reading difficulties

Grade	Typical developing learners					Learners with Chinese reading difficulties				
	N	Structural OA M(SD)	functional OA M(SD)	Reading M(SD)	Spelling M(SD)	N	Structural OA M(SD)	Functional OA M(SD)	Reading M(SD)	Spelling M(SD)
1	-	-	-	-	-	99	.639 (.248)	.526 (.231)	9.09 (9.42)	3.84 (5.66)
2	-	-	-	-	-	102	.717 (.230)	.568 (.214)	14.79 (12.27)	6.93 (7.70)
3	42	.874 (.108)	.902 (.121)	63.10 (28.55)	46.36 (28.52)	128	.791 (.207)	.670 (.203)	20.95 (15.62)	11.63 (9.59)
4	42	.860 (.098)	.904 (.164)	65.02 (36.54)	44.02 (32.18)	89	.873 (.162)	.726 (.199)	27.84 (17.13)	15.09 (13.38)
5	44	.939 (.075)	.959 (.064)	79.73 (28.34)	61.76 (30.85)	62	873 (.162)	.710 (.225)	32.16 (22.17)	22.87 (18.21)
6	-	-	-	-	-	33	.888 (.136)	.784 (.184)	36.82 (27.56)	31.00 (27.36)
Lower (G1&2)	-	-	-	-	-	201	.679 (.242)	.548 (.223)	11.99 (11.30)	5.41 (6.93)
Middle (G3&4)	-	-	-	-	-	217	.824 (.194)	.693 (.203)	23.78 (16.57)	14.20 (11.69)
Upper (G5&6)	-	-	-	-	-	95	.878 (.153)	.736 (.214)	33.78 (24.14)	25.69 (22.03)

a statistically significant difference, $F(1, 510) = 53.43$, $p < .001$, partial $\eta^2 = .173$. The Tukey post-hoc analysis revealed that the lower elementary grades' OA was significantly lower than the middle elementary grades' ($p < .001$) and upper elementary grades' ($p < .001$). There was no significant difference in OA between the middle and upper elementary grades ($p = .066$).

Learner types, grades, and OA facets

The 2 (OA facet) x 3 (grade) x 2 (learner type) mixed ANOVA did not show a statistically significant three-way interaction, $F(2,401) = 0.221$, $p = .802$, partial $\eta^2 = .001$. There was a statistically significant two-way interaction between OA facet and learner type, $F(1, 401) = 57.57$, $p < .001$, partial $\eta^2 = .126$. All other two-way interactions were not statistically significant ($p > .05$). The mean functional OA scores were higher in TD learners than in learners with Chinese RDs, with a mean difference of 0.220, 95% CI [0.181, 0.259], $p < .001$. The mean structural OA scores were higher in TD learners than those with Chinese RDs, with a mean difference of 0.056, 95% CI [0.021, 0.090], $p = .002$. Averaged across three grades, the gap between the two groups of learners (TD learners > learners with RDs) on OA was more salient for the functional aspect than the structural aspect.

Effects of different OA facets on word reading and spelling in TD learners and learners with Chinese RDs

Bivariate correlations

Table 3 presents the Pearson correlations between age at assessment, overall OA, structural OA, functional OA, word reading, and word spelling for the 128 TD learners (above the diagonal) and 513 learners with Chinese RDs (below the diagonal). For both groups of learners, all correlations were statistically significant (all ps < .001). Notably, OA was significantly correlated with both word reading and spelling for TD learners (rs = .450 and .410, respectively) as well as the learners with RDs (rs = .646 and .617, respectively).

OA facets predict word reading in TD learners and learners with RDs

A set of hierarchical multiple regression was run to test whether structural OA and functional OA independently predicted word reading, controlling for age, in TD learners. As shown in the bottom panel of Table 4, adding structural OA to the prediction of word reading led to a statistically significant increase (about 21%) in R^2. The addition of functional OA led to a further statistically significant increase (about 15%) in R^2. In the full regression model, the unique effect of both OA facets was significant ($\beta = .340$ and $\beta = .420$, respectively), with that of functional OA being stronger. These results indicate that structural and functional OA independently and significantly contributed to word reading in TD learners, with the contribution of functional OA being stronger.

Table 3, Pearson correlation for main study variables in typically developing learners and learners with Chinese reading difficulties

RDs^{TD}	Age	OA	Structural OA	Functional OA	Word Reading	Word Spelling
Age	-	.277***	.265***	.193***	.250***	.362***
OA	.449***	-	.791***	.844***	.646***	.617***
Structural OA	.411***	.870***	-	.340***	.505***	.507***
Functional OA	.356***	.843***	.468***	-	.551***	.504***
Word Reading	.475***	.450***	.383***	.388***	-	.854***
Word Spelling	.526***	.410***	.336***	.368***	.930***	-

*Note. TD: Typical developing learners (above the diagonal), N = 128; RDs: Learners with Chinese reading difficulties (below the diagonal), N = 513. *** p < .001*

The same regression analysis was conducted on word reading for learners with Chinese RDs from the lower, middle, and upper elementary grades (Table 4). In the lower and middle elementary grades, the addition of structural OA and then functional OA to the prediction of word reading scores led to a statistically significant increase (6.5% and 2.3% in lower elementary and 7.7% and 3.1% in middle elementary, respectively) in R^2. In the upper elementary grades, the unique effect of structural OA (β = .087), as opposed to that of functional OA (β = .289), was not significant. Taken together, these findings suggested that for learners with Chinese RDs, functional OA remained as a significant and robust predictor of word reading across all elementary grades.

OA facets predict word spelling in TD learners and learners with RDs

The same set of hierarchical regression analyses reported on word reading was conducted on word spelling for the two groups of learners. For TD learners, the overall pattern for the independent contribution of functional and structural OA facets was very similar to that for word reading. The addition of structural OA and functional OA to the prediction of word spelling led to a statistically significant increase (18.2% and 10.7%, respectively) in R^2 (see the bottom panel of Table 5). Both structural (β = .330) and functional OA (β = .350) independently contributed to word spelling in TD learners (both ps < .001), with the contribution of the functional aspect being slightly stronger.

Table 4. Hierarchical multiple regression predicting word reading from age, structural OA and functional OA in learners with Chinese reading difficulties and typically

	R^2	ΔR^2	β (p)
Learners with Chinese RDs			
Lower Grades (Grade 1 & 2) (N = 201)			
Age	0.084	0.084	0.212 (.002)**
Structural OA	0.149	0.065	0.194 (.010)*
Functional OA	0.172	0.023	0.169 (.020)*
Middle Grades (Grade 3 & 4) (N = 217)			
Age	0.053	0.053	0.141 (.032)*
Structural OA	0.129	0.077	0.222 (.001)**
Functional OA	0.160	0.031	0.190 (.005)**
Upper Grades (Grade 5 & 6) (N = 95)			
Age	0.011	0.011	0.063 (.527)
Structural OA	0.049	0.039	0.087 (.416)
Functional OA	0.119	0.070	0.289 (.009)**
Typically Developing Learners			
Grade 3-5 (N = 128)			
Age	0.060	0.060	0.080(.270)
Structural OA	0.270	0.210	0.340 (<.001)***
Functional OA	0.420	0.150	0.420 (<.001)***

Note. *p* < .05, ** *p* < .01, *** *p* < .001

Table 5. Hierarchical multiple regression predicting word spelling from age, structural OA, and functional OA in 513 learners with Chinese reading difficulties and 128 typically developing learners

	R^2	ΔR^2	β (p)
Learners with Chinese Reading Difficulties			
Lower Grades (Grade 1 & 2) (N = 201)			
Age	0.062	0.062	0.182 (.009)**
Structural OA	0.110	0.048	0.145 (.057)
Functional OA	0.141	0.032	0.197 (.009)**
Middle Grades (Grade 3 & 4) (N = 217)			
Age	0.073	0.073	0.206 (.002)**
Structural OA	0.111	0.038	0.147 (.036)*
Functional OA	0.133	0.022	0.160 (.021)*
Upper Grades (Grade 5 & 6) (N = 95)			
Age	0.043	0.043	0.168 (.088)
Structural OA	0.081	0.038	0.089 (.396)
Functional OA	0.146	0.065	0.278 (.010)*
Typical Developing Learners			
Grade 3-5 (N = 128)			
Age	0.131	0.131	0.210 (.005)**
Structural OA	0.313	0.182	0.330 (< .001)***
Functional OA	0.420	0.107	0.350 (< .001)***

Note. *p* < .05, ** *p* < .01, *** *p* < .001

For learners with RDs, as shown in Table 5, the addition of structural OA to the prediction of word spelling led to a statistically significant increase in R^2 in middle elementary grades but not in lower and upper elementary grades. Over and above age and structural OA, functional OA, however, was a significant, unique predictor of word spelling for all three elementary grade levels. The results suggested that functional OA plays a vital role in word spelling, as in the case of word reading, for learners with Chinese RDs throughout elementary school.

DISCUSSION

The present study investigated the development of OA and the relationship of different OA facets with Chinese word reading and word spelling in bilingual learners aged twelve and under, including TD learners and learners with Chinese RDs.

Orthographic awareness development in bilingual learners of Chinese

The first goal of the present study was to understand if there were developmental differences in two facets of OA (structural and functional OA) in bilingual learners of Chinese, including both TD learners and learners with Chinese RDs. The results showed significant developmental OA differences in TD learners. The OA score increased as learners progressed from grade 3 to grade 5. However, Tukey's post-hoc analysis revealed no significant difference in OA between grade 3 and grade 4 learners. There was also no significant difference between structural and functional OA in all three grades. It seems that structural and functional OA development has already reached a high level (ceiling) in grade 5 TD learners.

The results showed significant developmental OA differences in learners with Chinese RDs across the three elementary levels (lower, middle, and upper elementary). The OA score increased as learners progressed from the lower, middle, to upper elementary. The Tukey post-hoc analysis revealed that OA scores in the lower elementary grades were significantly lower than in the middle and upper elementary grades. The OA scores for learners with Chinese RDs were also significantly lower than those of TD learners in all three grades (Grade 3, 4, and 5).

Furthermore, there appears to be stagnated OA development from the middle to upper elementary grades in learners with Chinese RDs as there was no significant difference in OA between the middle and upper elementary grades, and the performance in upper elementary grades did not reach the ceiling (Table 2). In addition, the results showed that the difference in functional OA between the two reader types was more significant than that of structural OA. Based on the findings, we postulate that continued and sustained instruction in OA would be necessary for bilingual learners with Chinese RDs to help them overcome their impairments in OA and support literacy acquisition, with a greater focus on the functional aspect of OA.

These findings on OA in bilingual learners of Chinese seem to largely corroborate those on monolingual learners. For example, there was evidence to support the developmental progression of OA in typically developing pre-schoolers to school-age children (Qian et al., 2015; Tong, Tong, et al., 2017). There was also evidence to support that at the elementary school ages, there was a developmental difference where typical children first acquire structural knowledge in Grade 1 and 2 and then proceed to gain an understanding of the functional position and meaning of radicals as they grow older (Ho, Ng, & Ng, 2003; Lam & Tsui, 2013; Shu & Anderson, 1999). It is evident from the current study that there is a developmental progression of OA, and developmental differences exist in the two facets of Chinese OA, indicating that learners first acquire structural OA and then gradually acquire functional OA.

The result of the present study on bilingual learners of Chinese is consistent with previous monolingual studies that found that Chinese learners with dyslexia have deficits in Chinese OA. For example, Lee and Tong (2020) found that children with dyslexia are less sensitive to sub-lexical radicals' positional and functional regularity than typically developing children.

Contribution of different orthographic awareness facets to word reading and spelling

The finding that OA significantly predicted Chinese reading and spelling for TD learners and learners with Chinese RDs is consistent with the hypothesis, suggesting the importance of OA for learning to read Chinese as a mother tongue and second school language in Singapore. This general importance of OA found in bilingual learners of Chinese in Singapore corroborates the findings of previous studies that examined the role of OA in Chinese reading and spelling acquisition when learning Chinese as the first language (Cheung et al., 2007; Ho, Ng, et al., 2003; Li et al., 2012; Lin et al., 2019; McBride-Chang & Suk-Han Ho, 2005; Tong et al., 2009; Yeung et al., 2016; Yeung et al., 2011). The finding is also consistent with Wong (2020), whose study suggests that OA is key for students learning Chinese as a second language.

In the current study, the variance explained by the structural or functional OA in word reading ranged from 2.3% to 7.7% (Table 4), and the variance explained by structural or functional OA in word spelling ranged from 2.2% to 6.5% (Table 5). With the progression of developmental stage, an increased influence of OA, especially functional OA, on word reading and spelling was observed. There is a resonance between current study and previous studies on the increasing influence of OA on word reading and spelling as young learners develop.

In other studies, the variance in word reading accounted for by OA ranged from 2% (Li et al., 2012; Kindergarten), 5.7% (Tong et al., 2009; 3rd-year Kindergarten), 9.7% (Yeung et al., 2011; Grade 1), 24.01% (Wong, 2020; Grade 4 Chinese as Second Language Learners) to 36% (Yeung et al., 2016; Grade 2-4), and the variance in word spelling

accounted for by OA ranged from 2.7% (Yeung et al., 2011, Grade 1), 4.0% (Tong et al., 2009; 3rd-year Kindergarten), to 15% (Yeung et al., 2016; Grade 2-4).

In the following section, the similarities and differences of the regression results are discussed between the aspects below: structural OA and functional OA; TD learners and learners with Chinese RDs; learners in different stages of elementary school; and word reading and spelling.

Between structural OA and functional OA

Structural and functional OA was found to statistically significantly contribute to word reading and spelling in all three grades for TD learners. For learners with Chinese RDs, the structural OA statistically significantly contributed to word reading in the lower and middle elementary grades but not in the upper elementary grades, while functional OA statistically significantly contributed to reading throughout elementary school. On the other hand, the functional OA statistically significantly contributed to word spelling throughout elementary grades. The functional OA, as compared to the structural OA, seems to play a more salient, important, and sustained role in Chinese literacy acquisition among learners with Chinese RDs.

Between TD Chinese learners and learners with Chinese RDs

The present study revealed that the total amount of variance explained in literacy outcome by OA was smaller in learners with Chinese RDs than in TD learners in both word reading and spelling. While OA was also predictive of literacy abilities in the learners with Chinese RDs, the effect was smaller, showing that individual differences in literacy in bilingual learners with Chinese RDs were affected by their OA impairments alongside other factors.

Between different stages of elementary school

The size of the influence of OA on word reading and spelling seemed to be affected by the developmental stage of the learners. The functional OA contributes more significantly to word reading and spelling than structural OA in upper elementary learners (Grade 5 & 6) than in middle elementary (Grade 3 &4) and lower elementary (Grade 1 & 2) learners. This result is likely related to the development sequence of orthographic awareness in kindergarten and elementary school. In kindergarten to lower elementary, learners first develop structural OA. Hence, the impact of structural OA is likely to be stronger at the early stage of reading acquisition. As children progress from lower primary to middle and upper primary, their orthographic analysis shifts to the positional and specific knowledge of the radicals. Hence, functional OA becomes more critical for word reading and spelling.

Between word reading and spelling

The result also indicated that in both learner groups (more obviously in learners with Chinese RDs), the influence of structural and functional OA in word reading was more consistent and significant than in word spelling. One potential explanation for this difference might be related to the different cognitive processes related to the two literacy tasks. Spelling is regarded as more complex than reading (Bosman & Orden, 1997; Tong, McBride, et al., 2017). Different cognitive functions, such as orthographic awareness, morphological awareness, phonological awareness, and rapid naming, may have different levels of significance relating to the two types of literacy tasks (Chung & Lam, 2020).

In summary, the present study extended the understanding of OA in Chinese and literacy development in previous studies by distinguishing the facets of OA and examining its impact and contribution to reading and spelling abilities. The present study highlighted the particular importance of functional OA because this OA facet was consistently predictive of word reading and spelling in all groups, regardless of the reading competency and grade levels across elementary school. The differentiation in OA facets and its analysis related to literacy acquisition may have an instructional value in intervention for TD learners and learners with Chinese RDs. The salient role of functional OA in predicting word reading and spelling among learners with Chinese RDs in the upper elementary grades suggests that OA-focused intervention for Chinese language learning for learners with Chinese RDs should be sustained in elementary school, with a strong focus on functional OA to support word recognition and spelling.

LIMITATIONS & FUTURE STUDIES

Despite filling a notable gap in the literature with its focus on OA and bilingual learners of Chinese with RDs, the present study has a few limitations. To begin with, the OA task, which was drawn from Tan et al.'s study (2018), did not include the assessment of learners' specific radical knowledge, such as the meaning of semantic radicals and the pronunciation of phonetic radicals. Consequently, the findings on the developmental pattern with a close-to-ceiling performance from Grade 3 TD learners may be limited. It also suggests that the role of functional OA, despite the salient roles revealed in word reading and spelling, could have been underestimated in the study of bilingual learners of Chinese. Furthermore, the number of items in each subset of orthographic awareness may not be sufficient. The small number of items in each category may also explain the moderate reliability of the test.

The present study did not concurrently investigate other skills underpinning word reading and spelling in Chinese, including oral literacy, morphological awareness, rapid naming, and phonological awareness, which are noted in the literature to underpin dyslexia in Chinese monolinguals. This limitation should be addressed in the future studies to

generate a more comprehensive understanding of how multiple cognitive linguistic factors may interplay in explaining Chinese reading and spelling difficulties in bilingual learners.

Due to pandemic restrictions, the present study used two different data collection modes in learners with Chinese RDs, face-to-face and online. Although a mean comparison of the main variables revealed only three small but significant differences among the 24 pairs of comparisons, the learners' experiences during the assessments may be very different, and overall results should still be interpreted with caution.

CONCLUSION

This study generated important findings on the development of OA and the importance of different facets of OA in word reading and spelling in bilingual Chinese learners, especially those with Chinese RDs. Bilingual TD learners seem to achieve excellent structural and functional OA by middle grades in elementary school through regular school-based instruction and literacy experiences. On the other hand, bilingual learners with Chinese RDs, despite receiving regular school-based instruction in Chinese, could have significant OA impairment throughout elementary school, especially in the functional aspect of OA. Among learners with Chinese RDs, functional OA played an increasingly important role than structural OA for both word reading and spelling when learners progressed through lower elementary to middle and upper elementary. These findings collectively seem to lead to a conclusion that for bilingual learners with Chinese RDs, continued efforts to improve their OA and bridge deficits, especially in the functional OA aspect, through interventions across elementary school years would help them develop literacy skills.

ETHIC APPROVAL AND INFORMED CONSENT

This research involved human subjects and obtained approval from an independent ethics committee, the Dyslexia Association Singapore Research Committee. The approval number was RC-22-03.

This research was based on existing data, hence informed consents from the subjects were waived by the ethics committee.

STATEMENTS AND DECLARATIONS

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Catherine Chunhong Ni and Yun Rui Kong. The first draft of the manuscript was written by Yun Rui Kong, Catherine Chunhong Ni and Chien Ling Loo, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors report there are no competing interests to declare.

Data availability statement

The data that support the findings of this study are available from the corresponding author, [Ni, C.], upon reasonable request.

REFERENCES

Bosman, A., & Orden, G. (1997). Why spelling is more difficult than reading. In C. A. Perfetti, L. Rieben, & M., Fayol (Eds.), *Learning to spell: Research, theory, and practice across languages* (pp. 173-194). Lawrence Erlbaum Associates.

Chan, D. W., Ho, C. S. H., Tsang, S.-M., Lee, S.-H., & Chung, K. K. H. (2006). Exploring the reading–writing connection in Chinese children with dyslexia in Hong Kong. *Reading and Writing, 19* (6), 543-561. https://doi.org/10.1007/s11145-006-9008-z

Cheung, H., Chan, M., & Chong, K. (2007). Use of orthographic knowledge in reading by Chinese-English bi-scriptal children. *Language learning, 57*(3), 469-505. https://doi.org/10.1111/j.1467-9922.2007.00423.x

Cheung, H., & Ng, L. K. H. (2003). Chinese reading development in some major Chinese societies: An introduction. In C. McBride-Chang & H. Chen (Eds.), *Reading development in Chinese children.* Praeger.

Chung, K. K. H., & Lam, C. B. (2020). Cognitive-linguistic skills underlying word reading and spelling difficulties in Chinese adolescents with dyslexia. *Journal of Learning Disabilities, 53* (1), 48-59. https://doi.org/10.1177/0022219419882648

Dai, R., Liu, C., & Xiao, B. (2007). Chinese character recognition: History, status and prospects. *Frontiers of computer science in China, 1*(2), 126-136. https://doi.org/10.1007/s11704-007-0012-5

DeFrancis, J. (1989). *Visible speech: The diverse oneness of writing systems.* University of Hawaii Press.

Ho, C. S., Chan, D. W.-O., Tsang, S.-M., & Lee, S.-H. (2002). The cognitive profile and multiple-deficit hypothesis in Chinese developmental dyslexia. *Developmental Psychology, 38*(4), 543-553. https://doi.org/10.1037/0012-1649.38.4.543

Ho, C. S., Ng, T.-T., & Ng, W.-K. (2003). A "radical" approach to reading development in Chinese: The role of semantic radicals and phonetic radicals. *Journal of Literacy Research, 35*(3), 849-878.

Ho, C. S., Yau, P. W. Y., & Au, A. (2003). Development of orthographic knowledge and its relationship with reading and spelling among Chinese kindergarten and primary school children. In C. McBride-Chang & H.-C. Chen (Eds.), *Reading development in Chinese children* (pp. 51-71). Greenwood Publishing Group.

Kang, J. S. (1993). 现代汉语形声字形符研究 [Analysis of semantics of semantic-phonetics compound characters in modern Chinese]. In Y. Chen (Ed.), *现代汉语用字信息分析* [*Information analysis of usage of characters in modern Chinese*] (pp. 68-83). Shanghai Education.

Lam, H. C., & Tsui, B. M. (2013). Awareness of orthographic structure in children's learning of Chinese characters. *Contemporary Educational Research Quarterly, 21*(3), 83-111. https://doi.org/10.6151/CERQ.2013.2103.03

Lee, S. M. K., & Tong, X. (2020). Spelling in developmental dyslexia in Chinese: Evidence of deficits in statistical learning and over-reliance on phonology [Article]. *Cognitive Neuropsychology, 37*(7/8), 494-510. https://doi.org/10.1080/02643294.2020.1765754

Leong, C. K., & Ho, M. (2012). Training orthographic and sentence structures helps poor readers in Chinese. *International Journal of Disability, Development & Education, 59*(4), 359-378. https://doi.org/10.1080/1034912X.2012.723942

Li, H., Shu, H., McBride-Chang, C., Liu, H., & Peng, H. (2012). Chinese children's character recognition: Visuo-orthographic, phonological processing and morphological skills. *Journal of Research in Reading, 35*(3), 287-307. https://doi.org/10.1111/j.1467-9817.2010.01460.x

Lin, D., Mo, J., Liu, Y., & Li, H. (2019). Developmental changes in the relationship between character reading ability and orthographic awareness in Chinese. *Frontiers in Psychology, 10*, 2397. https://doi.org/10.3389/fpsyg.2019.02397

Lin, J., Wu, F., & Zhao, C. (2014). *新加坡学生日常华文用字频率字典[Dictionary of Frequently Used Chinese Characters Encountered by Students in Singapore and Its Frequency]* (1st ed.). 南大-新加坡华文教研中心出版社.

Lin, Y., Zhang, X., Huang, Q., Lv, L., Huang, A., Li, A., Wu, K., & Huang, Y. (2020). The prevalence of dyslexia in primary school children and their Chinese literacy assessment in Shantou, China. *International Journal of Environmental Research and Public Health, 17*(19), 1-12. https://doi.org/10.3390/ijerph17197140

McBride-Chang, C., & Suk-Han Ho, C. (2005). Predictors of beginning reading in Chinese and English: A 2-year longitudinal study of Chinese kindergartners. *Scientific Studies of Reading, 9*(2), 117-144. https://doi.org/10.1207/s1532799xssr0902_2

MOE. (2015). *2015 syllabus Chinese language primary*. Singapore Retrieved from https://www.moe.gov.sg/-/media/files/primary/chinese-primary-2015.ashx

Packard, J. L., Chen, X., Li, W., Wu, X., Gaffney, J. S., Li, H., & Anderson, R. C. (2006). Explicit instruction in orthographic structure and word morphology helps Chinese children learn to write characters. *Reading and Writing, 19*(5), 457-487. https://doi.org/10.1007/s11145-006-9003-4

Peng, P., Wang, C., Tao, S., & Sun, C. (2017). The deficit profiles of Chinese children with reading difficulties: A meta-analysis. *Educational Psychology Review, 29*(3), 513-564. https://doi.org/10.1007/s10648-016-9366-2

Qian, Y., Song, Y.-W., Zhao, J., & Bi, H.-Y. (2015). The developmental trend of orthographic awareness in Chinese preschoolers. *Reading and Writing, 28*(4), 571-586. https://doi.org/10.1007/s11145-014-9538-8

Shu, H., & Anderson, R. C. (1999). Learning to read Chinese: The development of metalinguistic awareness. In J. Wang, A. W. Inhoff, & H.-C. Chen (Eds.), *Reading Chinese script: A cognitive analysis* (pp. 1-18). Lawrence Erlbaum Associates Publishers.

Swanson, H. L., Harris, K. R., & Graham, S. (2013). *Handbook of learning disabilities* (2nd ed.). Guilford Publications.

Tan, A. H., Shen, P., Kong, Y. R., & Lay, S. Y. (2018). Assessment of the effectiveness of a Chinese literacy assessment tool for school learners in Singapore. *Asia Pacific Journal of Developmental Differences, 5*(1), 25-41. https://doi.org/10.3850/S2345734118000033

Tan, L. H., Spinks, J. A., Eden, G. F., Perfetti, C. A., & Siok, W. T. (2005). Reading depends on writing, in Chinese. *Proceedings of the National Academy of Sciences - PNAS, 102*(24), 8781 -8785. https://doi.org/10.1073/pnas.0503523102

Tong, X., Leung, W. W. S., & Tong, X. (2019). Visual statistical learning and orthographic awareness in Chinese children with and without developmental dyslexia. *Research in Developmental Disabilities, 92*, 103443-103443. https://doi.org/10.1016/j.ridd.2019.103443

Tong, X., McBride, C., Lo, J. C. M., & Shu, H. (2017). A three-year longitudinal study of reading and spelling difficulty in Chinese developmental dyslexia: The matter of morphological awareness. *Dyslexia, 23*(4), 372-386. https://doi.org/10.1002/dys.1564

Tong, X., McBride-Chang, C., Shu, H., & Wong, A. M. Y. (2009). Morphological awareness, orthographic knowledge, and spelling errors: Keys to understanding early Chinese literacy acquisition. *Scientific Studies of Reading, 13*(5), 426-452. https://doi.org/10.1080/10888430903162910

Tong, X., Tong, X., & McBride, C. (2017). Radical sensitivity is the key to understanding Chinese character acquisition in children. *Reading and Writing, 30*(6), 1251-1265. https://doi.org/10.1007/s11145-017-9722-8

Wei, T. Q., Bi, H. Y., Chen, B. G., Liu, Y., Weng, X. C., & Wydell, T. N. (2014). Developmental changes in the role of different metalinguistic awareness skills in Chinese reading acquisition from preschool to third grade. *PloS one, 9*(5), e96240. https://doi.org/10.1371/journal.pone.0096240

Wong, Y. K. (2020). The relationship between orthographic awareness and Chinese reading in Hong Kong's young CSL learners. *ECNU Review of Education, 3*(4), 678-693. https://doi.org/10.1177/2096531120930485

Wu, F., Lin, J., & Zhao, C. (2013). 新加坡学生日常华文用词频率词典*[Dictionary of Frequently Used Chinese Vocabulary Words Encountered by Students in Singapore and Its Frequency]* (1st ed.). 南大-新加坡华文教研中心出版社.

Yeung, P.-s., Ho, C. S.-h., Chan, D. W.-o., & Chung, K. K.-h. (2016). Orthographic skills important to Chinese literacy development: The role of radical representation and orthographic memory of radicals. *Reading and Writing, 29*(9), 1935-1958. https://doi.org/10.1007/s11145-016-9659-3

Yeung, P.-s., Ho, C. S.-h., Chik, P. P.-m., Lo, L.-y., Luan, H., Chan, D. W.-o., & Chung, K. K.-h. (2011). Reading and spelling Chinese among beginning readers: What skills make a difference? *Scientific Studies of Reading, 15*(4), 285-313. https://doi.org/10.1080/10888438.2010.482149

Zhang, D. (2017a). Multidimensionality of morphological awareness and text comprehension among young Chinese readers in a multilingual context. *Learning and Individual Differences, 56,* 13-23. https://doi.org/10.1016/j.lindif.2017.04.009

Zhang, D. (2017b). Word reading in L1 and L2 learners of Chinese: Similarities and differences in the functioning of component processes. *The Modern language journal (Boulder, Colo.), 101*(2), 391-411. https://doi.org/10.1111/modl.12392

An exploration of the perspectives of students with dyslexia regarding the factors that affect their learning

Nur Ashabiena Binte Mohd Ashraff[1*]

1.   Dyslexia Association of Singapore

Abstract

The Main Literacy Programme (MLP) at the Dyslexia Association of Singapore (DAS) offers a comprehensive curriculum for dyslexic students (Dyslexia Association of Singapore, 2022). However, some students may show better progress in the DAS than in schools. The present study explored the different contributing factors that affect learning in dyslexic students and their perceptions on the impact that these factors have in their learning. Semi-structured interviews were conducted with 6 participants (aged 14 -15) who are currently receiving intervention from the DAS. Thematic analysis of the results generated three themes: factors which are helpful to learning, factors which are barriers to learning, and factors which do not affect learning. Recommendations are made to encourage service providers to review and improve on their interventions, as well as encourage educators, parents and students to talk about these factors openly at the end of each term to help these students reach their truest potential. The findings have implications for dyslexia worldwide, to achieve more dialogue around effective outcomes for learning.

Keywords: Dyslexia, Children's Perspectives, Challenges, Dyslexia and Learning, Dyslexic Students, Factors Influencing Learning

* Correspondence to:
Nur Ashabiena Binte Mohd Ashraff, Senior Educational Therapist, English Language and Literacy (ELL) Division, Dyslexia Association of Singapore. Email: nur.ashabiena@das.org.sg

INTRODUCTION

Learning is natural for most students, but some require more effort and time to acquire skills and knowledge (Maurer-Smolder, Hunt & Parker, 2021). In Singapore, as in many other countries, they are often pulled out from their classrooms to attend additional remediation or interventions to help them keep up with the school's curriculum (Shaywitz, Morris & Shaywitz, 2008). They are often identified as having additional learning needs (ALN) with dyslexia being the most common learning disability (Kesherim, 2023).

Good spelling skills are crucial for forming other literacy skills (Treiman et al., 2019). In Singapore, primary students have to study and memorise words for weekly spelling tests (Nanavati, 2015) and students struggling with literacy are required to attend the Learning Support Programme (LSP) or School-based Dyslexia Remediation (SDR) (Toh, 2018) to improve their skills. Those needing more support may enrol themselves in specialized remediation.

The Main Literacy Programme (MLP) at the Dyslexia Association of Singapore (DAS) provides a comprehensive curriculum for dyslexic students which includes phonemic awareness, phonics, reading fluency, reading comprehension, language and vocabulary and writing (DAS, 2022). This aligns with the five elements identified by the National Reading Panel for an effective reading instruction (Rep. Natl. Reading Panel, 2000). Furthermore, Shaywitz, Morris and Shaywitz (2008) mentioned that interventions focusing on these areas are more effective than those focusing on only one.

Studies on the effectiveness of classroom interventions (Adams & Carnine, 2003; Foorman et al, 1998; Fuchs & Fuch, 2005), pullout remedial approaches (Blachman, 1997; D'Agostino & Murphy, 2004; Torgesen et al., 1999; Vellutino et al., 2006) and combinations of both (O'Connor, 2000; Simmons et al, 2003; Vaughn et al, 2003) found that interventions focusing on phonemic awareness, phonics and vocabulary improve core reading skills and lower the probability of students with reading difficulties by 5%. For older students, metacognitive strategies must be included to bring about an effective intervention (Sercenia et al., 2023; Yong et al., 2020).

AIMS OF RESEARCH

As students enrol themselves in higher institutions, they focus more on achieving the best grades in subjects instead of mastering new skills which might be more relevant to their careers (Brilleslyper et al, 2012; Jacobs et al, 2014; Pippin, 2014). Grades are crucial for students' success (Tocci, 2010; Schneider & Hutt, 2013; Schinske & Tanner, 2014; Higher Education Academy, 2015) but the pursuit of them can also lead to stress and diminish the learner's joy if they continue to keep getting grades which fall below their expectations (Dahlgren et al., 2009; Demirel, 2009; Tippin, Lafreniere & Page, 2012). Therefore, if having a grading system results in more stress than joy (Xiao et al., 2023), it

is worth exploring the views of students as to the impact of such stress and how it might be diminished in their learning experience.

Furthermore, experience shows that students learn differently in different environments (Lowyck, 2004), leading some parents to question why their children show better progress in the DAS than in schools. It is important to investigate whether students show improvement after attending interventions, why they consider those interventions to be effective, and whether learning and progress should be solely associated with grades and examinations.

Learners, teachers, educational therapists (EdTs) and parents need to truly understand the factors that may coexist to either support or impede learning as not every student will respond positively to the same type of interventions (O'Brien et al., 2023).

Therefore, this research aims to explore factors affecting learning based on dyslexic students' perspectives. Most of the existing studies focus on parents', teachers' and dyslexic adults' perspectives (Csizer, Kormos & Sarkadi, 2010; Goodacre & Sumner, 2020; Carroll & Iles, 2006) which may not accurately represent the struggles faced by dyslexic students (aged 13 to 17) in learning.

Research Questions

The two research questions for this investigation are

1. What are the different contributing factors according to existing research that may affect learning in dyslexic students?
2. What are the students' perceptions on the impact these factors have in their learning?

The different contributing factors will be identified by exploring students' perceptions of what they perceive the contributing factors to be. The findings could enhance existing intervention programmes by considering children's voices. It could also help to create more awareness in educators and parents about the factors that need to be addressed to support students' learning. It hopes to encourage educators and parents to hear students' voices and thereafter, consider the different lessons that they can take from it.

LITERATURE REVIEW

What is dyslexia?

Dyslexia is a contested term. Lopes et al (2020) analysed eight hundred peer reviewed journal articles published over the last 20 years. They found that most researchers identified persons with dyslexia as having a lower-than-average intelligence quotient (IQ)

even though this criterion alone is inadequate to prove that an individual has dyslexia (Beaujean et al., 2018). In fact, most researchers have debunked the myth that dyslexia and IQ are connected (Tanaka et al., 2011; Ferrer et al., 2010). Peterson and Pennington (2015) mentioned that it has often been assumed that IQ determines academic achievement. Hence, students with low IQ are thought to be poor readers. Wadsworth et. al. (2010) however, found that genetic differences contribute more to high-IQ dyslexic children as compared to low- IQ dyslexic children. Additionally, Friend et al. (2008) found that dyslexia tends to be more genetically based in children from high socio-economic status (SES). These studies therefore, suggest that even with high IQ, dyslexic children may still struggle with reading while showing better progress in other areas due to the ease of accessibility to resources in which dyslexic children from low SES may not have access to.

Zhou (2023) suggested that there are four factors that cause dyslexia: (1) neurological and genetic; (2) cognitive; (3) environmental and finally (4) cultural. It is believed that dyslexia may be caused by irregularities in the brain (Ramus, 2003), impairment in the cognitive ability to correlate letters to sounds (Stoodley & Stein, 2012), substance abuse and complications during pregnancy (Wajuihian & Naidoo, 2011), as well as differences in languages and diagnostic procedures (Maunsell, 2020). This suggests that dyslexia can be caused by many factors and to depend on only one factor to diagnose an individual with dyslexia is insufficient. A study conducted by Faudzi and Cheng (2022) on 99 teachers from different teacher training institutions in Malaysia even found that a majority of the teachers were not familiar with the symptoms and interventions for dyslexia. Most of them were not even trained in providing proper interventions for this group of students.

Furthermore, Reid (2011) suggested that no two students with dyslexia display the same characteristics. Flecher et al. (2007) further supported this by suggesting that the term 'dyslexia' is difficult to define due to two reasons: 'dyslexia' is a condition that exists within a person, thus making it an unobservable condition and 'dyslexia' is dimensional in that it exists on a continuum, ranging from mild to severe.

Even the Diagnostic and Statistical Manual of Mental Disorder, 5th edition, (DSM-5) definition of 'dyslexia' has been criticized. The DSM-5 defines 'dyslexia' as a "difficulty in mastering the relationship between the spelling patterns of words and their pronunciations" (Snowling & Hulme, 2012). The DSM-5 further suggests that children with dyslexia read aloud inaccurately and slowly, and they make spelling mistakes due to the weakness in phonological processing skills (Snowling & Hulme, 2012). However, Snowing and Hulme (2012) argued that the failure to include reading comprehension as part of the definition has failed to acknowledge that children with dyslexia are facing difficulties in this component. This has brought about a challenge in diagnosing any individual with dyslexia as well as creating a holistic intervention that focuses on all the important components.

Finally, the DAS defines dyslexia as "a type of specific learning difficulty identifiable as a developmental difficulty of language learning and cognition. It is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling." (DAS, 2019).

How does dyslexia affect learning?

Some dyslexic children struggle with word recall (Al-Lamki, 2012) due to poor working memory (Kaluyu & Ooko, 2016), with some displaying letter reversals and reading words backward (Zhou, 2023). This makes it difficult for them to read and comprehend passages, and they struggle with processing and remembering concepts. These challenges lead to delays in learning (Kaluyu & Ooko, 2016), low academic grades and high drop-out rates in school (Tops et al., 2012). In Singapore, it was found that educational experience for entrepreneurs with dyslexia was negative especially during their primary and secondary school education such as obtaining low academic grades and getting bullied due to their results which eventually leads to some of them giving up in their studies (Hewes, 2020).

Factors that affect learning in individuals with dyslexia

Individuals interact with various environments and are exposed to coexisting factors that either support or impede learning. The key factors identified in the literature are explored in turn below although it should be remembered that no two students are the same so the presence and impact of such factors will vary, sometimes greatly.

The first factor is the type of reading materials. To encourage dyslexic students to read early, it is important to use relatable reading materials that align with their personal interests (Nur et al., 2022) or experiences (Hadhrami et al., 2022). This approach helps them to quickly identify unfamiliar words due to their developed schema (Fink, 1995). Dyslexic adults can recognise unfamiliar words as accurately as those without dyslexia as long as there is context (Lefley & Pennington, 1991).

The second factor is the level of self-esteem. Negative experiences can bring about anxiety in dyslexic individuals (Csizer, Kormos & Sarkadi, 2010; Goodacre & Sumner, 2020; Carroll & Iles, 2006; Haft et al., 2019). Haft et al.'s (2019) study which compares the level of anxiety and attentional biases in dyslexic children (aged 9 to 16) and typically developing children found that dyslexic children avoid reading task due to difficulties, thus increasing their anxiety. Together with their sensitivity towards the feedback received from others, this may affect their self-esteem. This can lead to a vicious cycle where difficulties lead to an increase in anxiety, coupled with avoidance in attempting tasks which may cause stress and decreased motivation (Csizér, Kormos & Sarkadi, 2010; Łodygowska, Chęć & Samochoweic, 2017) especially in students who do not go through any intervention. Additionally, dyslexic students often have low self-concept (Csizér,

Kormos & Sarkadi, 2010; Pitt & Soni, 2018; Burden & Burdett, 2005; Zisimopoulos & Galanaki, 2009; Goodacre & Sumner, 2020) which is a combination of perceived competence and reflecting their difficulties in making progress without support.

The third factor is motivation. Wang, Chen and Solheim (2020) found that intrinsic motivation, such as perceived control, ease of use and usefulness of learning platforms is crucial for dyslexic students to engage in e-learning. They suggest that students should have the freedom to choose and progress at their own pace. The platforms should be easy for students to access and use, and the acquired knowledge and skills should be transferrable to other subjects. Under extrinsic motivation, Wang, Chen and Solheim (2020) found that attitude towards learning plays an important role in ensuring that students remain engaged in learning. As mentioned above, negative experiences can lead to students avoiding reading and writing tasks due to low levels of motivation and high levels of anxiety. This may create disengagement and boredom, as it might take them a longer time to show improvement in their progress.

The fourth factor is perceived support from family and teachers. While dyslexic students may receive significant support from their families and teachers, it does not necessarily mean that it is enough (Nalavany & Carawan, 2011). The perception of support varies, with some viewing it as 'being cared for' while others see it as 'being provided assistance from others'. (Turner, Frankel & Levin, 1983; Turner, Sorenson & Turner, 2000). A study by Nalavany and Carawan (2011) found that family or social support should be provided throughout childhood to early adulthood, as positive emotions experienced by dyslexic adults and the support provided can improve their self-esteem.

Csizer, Kormos and Sarkadi (2010) conducted interviews with fifteen Hungarian students to understand their language learning experiences to help educational institutions develop effective instructional programmes. They found that dyslexic students are often exempted from taking a second language, often the English Language, without being provided with adequate support to help them overcome their challenges. This affects their opportunities to enrol in universities and secure better careers. Another study conducted by Moriña (2019) on university dyslexic students, the importance of teachers building rapport with students outside of the classrooms was emphasized by asking about their personal lives such as simply asking them about their days.

Rappolt-Schlichtmann, Boucher and Evans (2018) conducted a focused literature review that included the strategies for Universal Design of Learning. They concluded that intervention programmes should focus on students' strengths to achieve academic success. They believed that defining dyslexic students by their deficits, prevents them from developing their strengths and therefore, prevents them from being successful.

Finally, dyslexic students may exhibit dispositional perfectionism (Stoeber & Rountree, 2020) which is characterised by having exceedingly high standards that are difficult to

meet (Stoeber, 2018b). These students exhibit a high level of self- stigmatization and maladaptive coping. Negative experiences such as poor academic achievement and unsupportive parents and educators, can lead to low open-mindedness, agreeableness and conscientiousness in students with dyslexia (Gagliano et al., 2014) leading to the feeling of helplessness and lack of self-worth. However, long-term research has not been conducted to determine whether this change in personality will further affect learning in these readers. Tops et al.'s (2013) study found that there is no difference in personality traits in adults with and without dyslexia.

Summary of factors that influence learning
- ♦ Type of reading materials
- ♦ Level of self-esteem
- ♦ Motivation
- ♦ Perceived support from family and teachers
- ♦ Dispositional perfectionism personality

Present study

Previous studies demonstrated that individuals with dyslexia are affected by different factors. This study hopes to understand the perceptions of school students in the Singaporean context as to how different contributing factors have influenced their learning and hopefully help to improve the current intervention by considering children's voices.

METHODOLOGY

Introduction to research

Research was undertaken to (a) identify the different contributing factors that may affect learning in dyslexic students and (b) understand students' perceptions on the impact that these factors may have on their learning. The research aimed to identify additional factors in existing studies and understand the perspectives of students aged 13 to 17 on learning.

Design

This study utilized a qualitative research approach to investigate the factors influencing learning in dyslexic students and their perspectives on them. This allows room for exploration (Alchemer, 2010) and provides us with a deeper understanding on how people perceive their social realities which affect their behaviours (Mcleod, 2023).

This research followed the abbreviated approach of the grounded theory in which the data collected were analysed using thematic analysis. Thematic analysis was more

relevant as there was no return to the field for data collection or coding processes. Thematic analysis was guided by the steps as outlined by Braun and Clarke (2006) which include (1) familiarisation with the data, (2) generate initial codes, (3) search for themes, (4) review themes, (5) define and name themes and (6) produce report.

Pool and Ansems (2022) suggest that thematic analysis provides the foundation when it comes to analysing data in any qualitative research including grounded theory. The main tenet of grounded theory: "social phenomena can be explored and understood by using a research process that is led and guided by participant experiences, resulting in a coherent theory that reveals and explains patterns reflected in those experiences" (Glaser & Strauss, 1967) was not violated.

Participants

Seven participants from the DAS agreed to participate in the research. However, due to sickness and hectic schedule, one participant decided to withdraw. They were diagnosed with dyslexia by the DAS SpLD Assessment Services (SAS) or by external specialists and had been attending MLP for at least 6 months. Table 1 shows the background of participants.

Table 1. Participants' Background

Participant	Age	Gender	School (Stream)	Receive Bursary	Months in MLP	Are parents working?
A	14	M	S2NT	Yes	53	Yes (both)
B	15	F	Y3	Yes	40	Yes (both)
D	15	M	S3NT	No	49	Yes (both)
E	14	M	S2NA	No	16	Yes (both)
F	15	F	S3NT	No	57	Yes (both)
G	14	F	S2NA	No	77	Yes (father)

Key: Gender (M-Male, F-Female)
           School (Stream):
           S2NA (Secondary 2 Normal Academic)
           S2NT (Secondary 2 Normal Technical)
           S3NT (Secondary 3 Normal Technical)
           Y3 (Year 3)

Participants below the age of 12 were not included as they may not have developed adequate comprehension skills to be able to understand the tasks assigned and the questions asked (Zisimopoulos & Galanaki, 2009). For each participant, only one face-to-face semi-structured interview session was conducted, and all participants together with their parents gave permission for their responses to be used in this research. As compared to other participants who attend normal schools which follow the normal school curriculum, Participant B attends a technical school in which students are equipped with hands-on vocational education which includes Institute of Technical Education (ITE) Skills Subjects such as Culinary and Restaurant Operation (CRO) and Mobile Web Applications (MWA) (MOE, 2024).

Ethical Considerations

Research involving children may usually give rise to power disparities and dynamics (Gallagher, 2008 & Holland et. al., 2010). Children may view researchers as authoritative and provide appropriate responses to please the researchers (Einarsdóttir, 2007). Lane et. al. (2009) emphasized the importance of not assuming that rapport between participants and researchers has been established.

To reduce social desirability bias,
1. participants were informed that their responses were crucial in helping parents and educators understand their strengths and struggles in learning,
2. interview session was conducted in a familiar environment (DAS Bishan Learning Centre classroom),
3. pseudonyms were used to replace their names and
4. interview questions were first vetted by the Faculty Research Ethics Committee at University of South Wales (USW) and the DAS Research Committee.

This research was also guided by the commitments listed by the International Charter for Ethical Research Involving Children (Graham et al., 2015). Participants were informed that they could choose not to answer any question that might cause discomfort. Constant check-ins were carried out throughout the interview to ensure that participants were comfortable to move forward with the remaining questions. Debrief was conducted at the end of the interview session.

Pilot Study

Castillo-Montoya (2016) emphasized that pilot studies help researchers to identify the flaws and limitations in the interview design. She further explained that this would allow researchers to make any modifications to the interview questions. Majid et al. (2017) also believes that this will help researchers to prepare themselves for the main study by practicing their interviewing skills. Therefore, a pilot study was conducted to ensure that

questions asked would not trigger any discomfort to the participants and that the questions were valid for the purposes of the study. This is important so that participants would be willing to share their responses openly with a calm mind, thus generating better research outcome. Two participants went through a 20 minute face-to-face semi-structured interview, 3 weeks before the main study. The procedure for this was the same as the main study.

Data collected were analysed using thematic analysis. It was found that the questions set for the interview were relevant and appropriate. Some minor changes were made to the interview questions in which there would be a follow-up question, "Do you think that this affects your learning?" to the following questions: (1) Do you get nervous when you have to complete certain assignments or work? and (2) Do you get anxious before, during or after a test or an examination?

Procedures and materials

Convenience sampling was carried out in which emails were sent to EdTs from DAS Bishan Learning Centre to explain what the study was about and to ask them to assist in the recommendations of students to participate in the study. These were followed up with further emails with information sheets and consent forms attached which were sent out to parents whose children fit into the above age group. Parents and children who expressed their interest to participate were contacted via phone call, Microsoft Teams or face-to-face to provide them with opportunities to ask any questions that they might have before giving their consent. In order to participate, children and parents should state their agreement to participate and give their consent. Participants were informed of their rights to withdraw from the study at any time. They were also informed that pseudonyms would be used to replace their names and their responses would be encrypted with passwords to ensure confidentiality and anonymity.

Schedules for the 20-minute one-to-one interview sessions were arranged with the participants. Semi-structured interviews allow us to understand participants' experiences better through conversation (Ruslin et al., 2022) as it allows room for new questions to emerge during the interview as a follow-up to the participants' responses. Each participant received the interview questions a week before their scheduled interview session to give them ample time to prepare their answers. During this period, they were allowed to clarify their doubts.

On the day of the interview session, participants were reminded that they have the right to not answer any question that might cause discomfort and it would not put them at any disadvantage or have any impact on them as students with the DAS. Each interview session was conducted face-to-face at DAS Bishan Learning Centre classroom. It was audiotaped and transcribed. Participants checked the accuracy of the transcripts before they were analysed.

Semi-structured interview questions

Participants answered a total of 25 questions. The 17 open-ended questions began with questioning participants about their own definition of 'learning' to understand whether they associate learning with just the academic domain. Participants were asked to share and elaborate on factors that have helped to make learning easier or challenging for them. It then went on to trying to understand how the DAS and schools have helped and supported them in their learning and what else can be improved to help them in their learning further. Questions were set to understand their perspectives on how dyslexia has either helped or impeded their learning. Participants were also asked to think about the way that concepts were taught or presented in different subjects and share their views on this. These questions also asked participants for the kind of support that they had received and hope to receive.

Participants were asked to define what 'success' means to them. They were given the opportunity to share what they hope others will know about them which include their emotions, mental well-being and thoughts with regards to their strengths and weaknesses. Finally, participants were told to consider whose expectations matter the most and whether being given the opportunity to set their own expectations will help them in their learning.

Finally, the 8 close-ended questions focused on what matters to the participants when they received back their results, their perceptions on who they found as more approachable and was able to understand them better. These questions also focused on their feelings before, during and after an examination as well as when they have to complete certain assignments and tasks.

RESULTS

Thematic analysis of the interviews generated three overarching themes:
1.   factors which are helpful to learning,
2.   factors which are barriers to learning and
3.   factors which do not affect learning.

1. Factors which are helpful to learning

1a. High aptitude

Most participants defined learning as the acquisition of new knowledge, skills and experiences from teachers:

> *"Learning means to take in knowledge that my teachers teach me."* (Participant G);
> *"And education to get knowledge."* (Participant E).

When prompted, only three participants defined learning as the acquisition of skills in the non-academic domain which includes daily activities:

> *"Yes ... Like learn how to wash your clothes, do the dishes and all those."* (Participant G)

Four participants considered learning to be beneficial for their future, both financially and socially. For example.

> *"It helps you earn money in a way."* (Participant A);
> *"Can have more options in the future."* (Participant E).

Learning has helped Participant F build her confidence and improve her abilities:

> *"make you more confident in that topic, helps me to study better."* (Participant F).

Two participants believed that dyslexic students learn things differently and they are smarter:

> *"They say I have a computer in my brain. It's just that I'm different in a good way."* (Participant G).

1b. Good learning attitude and behaviour

Participant D believed that without determination, students may not have the willingness to attempt assignments or concentrate during lessons which may affect their examinations:

> *"If your learning attitude is not there, you won't like want to do the work that is given to you or concentrate in class. Then when the exam come, you won't know how to do it."* (Participant D).

Participant F remained positive during the examination period:

> *"When you think that you will pass, then you might actually pass if you study for it."* (Participant F).

Participant A suggested on learning from mistakes:

> *"if I make a mistake, I just learn from it."* (Participant A).

Three participants believed in perseverance:

> *"Like at first they are like cannot make it at all but then they slowly slowly do then after that they become successful."* (Participant B).

Two participants took the initiative to ask their teachers for help:

> *"Like if I don't know how to spell a word right, I will ask them for help."* (Participant B);
> *"If I don't understand, I go to tuition to ask them"* (Participant D).

1c. Supportive social environment

Participants would want to be given the opportunity to choose which subjects to focus on after being exposed to all subjects:

>*"I think ya you should have a choice."* (Participant D);
>
>*"Some subjects I really don't need them in my future. It's useless."* (Participant G);
>
>*"Just take. After that if you cannot do, then you don't do."* (Participant B).

Most students felt that it is important to set realistic expectations:

>*"It's achievable and like cause everybody learns at their own pace so I can set like my goals at my own pace."* (Participant D);
>
>*"Like Chinese, I always fail but then I got improve so my teacher and parents are very proud of me."* (Participant G).

Two participants set higher expectations for themselves so that they would put in more effort:

>*"the higher the expectation, the more hardworking I will be."* (Participant G).

Additionally, teachers should have the ability to teach and help students:

>*"The teacher will know how to teach properly"* (Participant B);
>
>*"Or more better teachers that can understand me and help me."* (Participant G).

Participant D found it easier to understand the concepts taught if he understands what his teachers are saying:

>*"If you understand whatever the teacher is saying then ya it's easier."* (Participant D).

Participant G found her non-DAS tuition teachers approachable due to the good support that they provide:

>*"The teachers are really nice. They give free consultations whenever I need them and they are understanding of me."* (Participant G).

Participant D's tuition teacher helped him understand concepts covered in school:

>*"I think they will help us in understanding the topics that school covers and if I don't understand, I go to tuition to ask them."* (Participant D).

Five participants perceived that they received good support from DAS teachers. Participant G found the lessons fun and engaging:

>*"It's fun and engaging."* (Participant G).

Participants found that the DAS has helped to improve their grades, reading abilities and understanding of words:

>*"It moves my grade higher."* (Participant B);
>
>*"Help me understand the words better like reading difficult words."* (Participant E).

Participant E perceived that he received good support from his school teacher in the form of remedial lessons:

>"*Having remedial lessons.*" (Participant E).

Participant D found that it was better to approach teachers as they are more knowledgeable in the subject matter:

>"*Teacher, I think they know more, like the specific things you want to ask them and they can answer to you.*" (Participant D).

Most participants perceived dyslexic friends to be supportive as they are non-judgemental:

>"*You will not get judged easily because a lot of people I know, they are dyslexic also.*" (Participant F).

Participant D and B felt that friends were able to understand them as they spent most of the time with them:

>"*friends are like the people you spend most time with and you feel comfortable going to them*" (Participant D);
>"*Friends like they are close to you enough to just share about things.*" (Participant B).

1d. Supportive learning environment

When asked to choose two easiest subjects, participants chose subjects with concepts and contents that are easy for them to understand such as English, Mathematics, Science and Literature.

Participant B learned and understood concepts better when they were being taught by topics:

>"*The teacher will go by topic by topic.*" (Participant B).

Furthermore, eleven strategies were found to be helpful:
1. revise consistently,
2. repetition,
3. less memory work,
4. direct and simpler strategy,
5. exposure to similar questions,
6. transferrable knowledge,
7. setting different expectations for each student,
8. implementing different coping strategies,
9. breaking down of concepts,
10. providing examples and,
11. encouraging independence.

Two participants believed in the importance of practice and revision:

> *"Erm, I try studying for like 1 hour."* (Participant A);
> *"Do my own practice."* (Participant E).

Participant F found repetition helps in memorising of concepts:

> *"When we did the question and then they may repeat the solutions and make it like more easier by memorising."* (Participant F).

Participant E, however, felt that he could learn better when the subject involves less memory work:

> Researcher: *"Okay, but it (literature) requires a lot of memory work, right?"*
> Participant E: *"No."*

Participants found that it is useful for teachers to expose students to direct and simpler methods and break them down into manageable chunks:

> *"they say like subject like this Math. Then they put it in a way that I can understand."* (Participant A);
> *"If they somehow find an easy, a slightly easier method to teach."* (Participant F);
> *"Like they break it down for me and give examples."* (Participant G).

Additionally, two participants felt that being exposed to similar question types will help them to answer such questions easily.

Participant F also believed that concepts learned in learning centres should be transferrable to the school context. Participant F believed that teachers should set different expectations for each student:

> *"At least set a motivation for each student."* (Participant F).

Three participants revealed that they had different coping strategies such as not revealing their diagnosis, ignoring people who judge them, listening to music and participating in sports:

> *"it's just no point of telling someone if it doesn't concern them anyway."* (Participant A);
> *"Ignore."* (Participant F);
> *"It (music) makes me more focused."* (Participant B);
> *"Why do you love PE?"* (Researcher).
> *"I can release the stress, release the anger."* (Participant B).

Participant D felt that teachers should encourage students to be independent in their learning:

> *"Like teachers help us to learn things by ourselves like this thing called SIL – Self-Initiated Learning.* (Participant D).

Participants identified five teaching aids that are useful to their learning:

1.   games,
2.   electronic devices,
3.   lesser worksheets,
4.   hands-on activities, and
5.   worksheets applicable to school's curriculum.

Three participants believed that learning through games would make the lesson fun and less boring.

Three participants preferred to use electronic devices such as laptops:

"Like more electronic related instead of worksheets every time" (Participant F).

Participant B explained that with the computer, there is less writing, and there is a spelling and grammar checker:

Participant B: *"Just no need to write so much, we can type."*
Researcher: *"Is it because computer helps you to like correct your spelling and mistakes and all?"*
Participant B: *<nodded>*

Two participants also found that they enjoyed learning when it involved hands-on activities:

"the other is like craft things." (Participant A);
"My school more hands-on." (Participant B).

Worksheets assigned at DAS should be applicable to the school's curriculum:

"Some of the worksheets is like similar to what I did in school." (Participant F).

Participants also preferred learning in such environment:

1.   conducive class,
2.   quiet class,
3.   face-to-face lessons,
4.   student's condition understood and,
5.   fun and interactive.

Participant A preferred an air-conditioned classroom:

"If there is air-con, basically, it will be relaxing." (Participant A).

Participant B preferred to have music in the background:

"Music. It makes me more focused." (Participant B).

In contrast, Participant D preferred a quiet, face-to-face class:

"I think as long as it is quiet, face- to-face." (Participant D).

Participant G would like to be in classes where teachers could understand her condition:

> *"Or more better teachers that can understand me and help me."* (Participant G).

1e. Extrinsic motivation

External motivation specifically rewards has encouraged students to achieve the goals:

> *"If someone says if I were to do something, in return, I can get something back then I will just say, "Oh, okay, I'll do it."* (Participant A);
> *"And then after that they can get a small prize if they reach their goal."* (Participant F).

Participant F, however, also emphasized on the importance of being internally motivated even if she fails an examination:

> Researcher: *"If you study very hard for something right, but then you fail, will your attitude change towards it?"*
> Participant F: *"No because I've tried."*

2. Factors which are barriers to learning

2a. Poor learning attitude and behaviour

Negative emotions may affect students' mood for learning:

> *"Because if angry then no mood to do anything. Then sad, still don't want to do because no mood."* (Participant B).

Participant D mentioned that laziness and inability to remain focused during lessons have affected his learning:

> *"Sometimes I will do it, sometimes I'm lazy to do it after school. Usually I doze off like think of something else."* (Participant D).

2b. Unsupportive learning environment

Four participants found it difficult to remember heavy content especially if there is no benefit in learning them:

> *"if there is a lot of subjects and topics and you have to like memorise everything that you have learned then when there's a test, sometimes you might not remember"* (Participant A);
> *"Cause they have a lot of topics and it's very hard"* (Participant F);
> *"It's too hard and it's kind of useless."* (Participant G).

Participant B found it unhelpful for teachers to add topics to the already existing curriculum:

"They will see how if they can teach finish one topic first or not. They will shift up to Sec 4." (Participant B).

Four participants found certain concepts especially Chinese confusing and incomprehensible:
"I'm very bad in Chinese since young and I can't remember the words. I can't speak the words. I can't read the words. I can't write the words." (Participant G);
"Because there is a lot of random lines. Some of the pronunciations are the same but they are a totally different word." (Participant F).

Some participants felt that certain words, concepts or questions were difficult to understand:
"when you set the questions too difficult." (Participant F);
"Long words 'cause my brain cannot process." (Participant G).

Three participants found that memorising too much content was unhelpful:
"some people cannot memorise too many things, at the same time forget other things." (Participant E);
"Because there is a lot of topics and then they all have different solutions and different methods." (Participant F).

Participant F found her teachers' method confusing:
"Usually, they make me more confused." (Participant F).

Additionally, two participants found it challenging to elaborate on their answers:
"It's the way you phrase the answer." (Participant E);
"'cause you need to elaborate in writing. I'm bad in elaborating" (Participant D).

Participant F struggled to keep up due to the fast teaching speed:
"and it's also hard to follow up." (Participant F).

Participant G preferred worksheets to electronic devices due to the confusing functions:
"Not really cause they also use electronic devices and they are too heavy. I don't want to bring them to school and it kind of confusing to use sometimes like making slides and google docs and all those. So I prefer tuition cause it's all on paper." (Participant G).

However, Participant F would want teachers to use fewer worksheets as she described her teacher as using too much textbook:
"More textbook and more SLS." (Participant F).

Participants also preferred not to learn in the following environments:
1.   boring and not interactive,
2.   online lessons and,
3.   noisy class.

Participant F found that having many students in her class was unhelpful as everyone learns at different speeds:

> *"also a lot of people. Some people learn in different speed. Some people already know how to do then some people still don't know how to do."* (Participant F).

2c. Unsupportive social environment

Most participants perceived that they did not receive good support from their school teachers. Participant G assumed that her teachers did not understand her condition:

> *"Get better teachers that can understand my condition."* (Participant G).

Participant E found his teachers fierce and not approachable:

> *"Some teachers might be fierce."* (Participant E).

Two participants felt that teachers did not set aside time to meet before school ends:

> *"most of them are really free after school."* (Participant D).

Participants also felt that teachers only paid more attention to other students:

> *"They still pay attention but lesser."* (Participant B).

Participant F did not have good rapport with her teachers as she perceived her teachers as judgemental which made it awkward for her to ask for help:

> *"I don't like the teachers there because it's awkward."* (Participant D).

Participant F noted the consequences of having a dull and boring teacher:

> *"Because the teacher is too boring. Everyone all falls asleep in his lesson."* (Participant F).

Participant B did not want teachers to skip topics and shift them to the next curriculum:

> *"Most of the teachers will jump topics. They will see how if they can teach finish one topic first or not. They will shift up to sec 4."* (Participant B).

Participant G mentioned that she was uninterested in what her teachers were saying:

> *"Because the things that they talk about is not what I'm interested in."* (Participant G).

Two participants found that teachers have unrealistic teaching expectations:

"if there is a lot of subjects and topics and you have to like memorise everything that *you have learned then when there's a test, sometimes you might not remember."* (Participant A).

Participants perceived that they did not receive good support from their parents due to the huge age gap, strictness and their inability to guide them:

"Is it because of the age factor?" (Researcher)

"Ya." (Participant E); *"Strictness"*. (Participant E);

"My parents didn't finish school so I can't really trust them and when I tell them things I learned, they will be like, "Oh, what is that? I didn't learn that in secondary school." (Participant G).

Only one participant perceived poor support received from friends as she perceived herself to be smarter than them:

"My friends are dumber than me. I'm normally the one that teach them." (Participant G).

Most participants felt that parents set expectations that were unachievable which leads to stress:

"Cause like they will set it higher than mine and then I find it like stressful but if I set mine and I achieve mine, I will be like happier." (Participant D).

Participants hoped that parents hear them out when setting expectations especially if they consistently fail the same subjects:

"Because they know I am bad at that subject. Ya, they know I never pass at that subject before and I still didn't." (Participant F).

2d. Motivation

Two participants found that praise would not encourage them to learn better:

Researcher: *"Is giving praises enough? Like maybe you don't get a prize right for example then you get a praise."*

Participant F: *"No."*

2e. Low aptitude

Three participants felt that they were unable to read and spell as well as non- dyslexic students:

"I will be able to read better." (Participant D);

"cannot spell a lot of words." (Participant B).

Participant D felt that he learned slower and was unable to complete the paper on time due to his difficulty:

> *"I guess we learn slower. I cannot finish the paper because maybe I don't understand sometimes."* (Participant D).

3. Factors which do not affect learning

3a. Negative emotions

The negative or neutral emotions felt by other participants did not affect their learning except for one participant who felt that panic during an examination might affect her ability to answer the questions:

> *"Panic. If it is something that I didn't learn, I might panic and everything will go downhill from there."* (Participant G).

3b. Different school curriculum

Despite the differences in curriculum between normal schools and technical schools, such curriculums do not seem to affect their learning. Instead, their learning is affected by a combination of factors as discussed under 'Factors which are helpful to learning' and 'Factors which are barriers to learning'.

DISCUSSION

The current study explored children's perceptions of various factors influencing their learning. Participants' responses shed important light on helping educators and parents understand the factors that students found to be useful or not useful to their learning. Three themes were generated: factors which are helpful to learning, factors which are barriers to learning, and factors which do not affect learning. Below, results of the primary research are discussed in the light of findings analysed in the literature review section above.

This study found that positive learning attitudes such as determination, optimism and calmness, helps students stay engaged and less distracted, while a negative attitude can negatively impact their learning. This aligns with Wang, Chen and Solheim's (2020) research which suggests that learning attitude is crucial for student engagement. However, participants did not view learning attitude as part of external motivation. External motivation was viewed as receiving rewards from parents or teachers. Findings also suggest that goals should be set differently for each student as every student learns at a different pace. Participants also valued physical rewards more than verbal praise to reinforce their positive behaviour such as getting good grades or improved marks.

The study by Wang, Chen and Solheim (2020) found that students' intrinsic motivation in e-learning is influenced by perceived ease of use, usefulness and control. However, participants defined intrinsic motivation as their ability to acknowledge their effort regardless of their examination results. Furthermore, most participants preferred using electronic devices as there is less writing and they could use spelling and grammar checkers. However, some participants found such applications confusing. Additionally, some participants preferred face-to-face to online lessons as they were able to focus better.

The results also suggest that participants prefer to focus on subjects they excel in, rather than those they find less useful. This finding is new and should be taken into consideration when students select their subjects in Secondary three.

Findings also showed that some participants view dyslexia as a strength, while others view it as a weakness. Intervention should focus on their strengths instead of their weaknesses as suggested by Rappolt-Schlichtmann, Boucher and Evans (2018). Strategies such as consistent revision, repetition, using direct and simpler strategies, exposing students to similar questions, providing relevant examples, breaking down concepts and, implementing different coping strategies should be implemented in interventions. Strategies which focus on too much memory work and do not allow room for flexibility should be minimized. Most participants felt that they have poor cognitive functions due to poor working memory (Kaluyu & Ooko, 2016). This made it difficult for them to remember or recall concepts or suggested solutions.

Students who exhibit a perfectionism personality often set high expectations for themselves which are often impossible to meet, leading to anxiety and helplessness (Stoeber & Rountree, 2020). However, the current research shows that participants set high expectations so that they would put in effort in their revision. Negative or positive emotions felt during examinations did not affect their performance. Only one participant experienced this downward spiral effect due to her inability to answer questions that she did not study for. Hence, to prevent students from falling into this vicious cycle, good coping strategies should be introduced to help them manage stress (Csizér, Kormos and Sarkadi, 2010). Some of these strategies include hiding their dyslexia, ignoring those who judged them, listening to music for focus and participating in sports to release frustration.

Additionally, school teachers were often perceived as strict and busy. Participants often felt that they were lacking attention due to large class sizes. Building good rapport is important between teachers and students (Moriña, 2019) and teachers should not rush through teaching without considering students' learning difficulties. It was also not helpful for teachers to skip or add topics due to the struggle that they have in remembering information. Additionally, while participants understood that certain content could be confusing and incomprehensible, they valued teachers who assisted them in breaking down complex concepts. Nalavany and Carawan (2011) also suggest that while dyslexic

students may receive support from their families and teachers, it does not necessarily mean that the support is enough.

Similar to Fink (1995) who believed that students learn better when teachers use interesting materials, participants also preferred fun and interactive lessons which include games and hands-on activities. Despite that, most participants would still prefer a smaller class size and, a quiet and conducive learning environment.

Nevertheless, participants acknowledged the significance of good learning behaviour such as attentiveness, perseverance and, learning from mistakes. They believed that laziness and inattentiveness could make them less focused. Participants also understood that good study habits could lead to better opportunities such as a good salary and job. However, some participants believed that success extends beyond academic achievements.

It is also important to note that different participants viewed different factors as important. Therefore, it is recommended for service providers to look at these factors to help dyslexic students improve and succeed in both normal and technical schools.

Although a wealth of data has been considered here, it is important to acknowledge the limitations of this research. Firstly, participants were recruited from one service provider which is known for providing intervention to dyslexic students. It would be beneficial to consider participants from other service providers who may provide similar intervention. Secondly, the sample size was small and might not reflect the full dyslexic population. Future research could choose a wider pool of participants so that findings could be more generalised to a wider dyslexic population. However, due to the depth of qualitative research, it could also be argued that a larger sample size would not be needed.

A practical implication of the current research findings is to help educators and parents understand the underlying factors that affect learning in dyslexic students. Service providers should continue to review and improve the interventions that they provide based on students' voices. Having a supportive learning environment for dyslexic students is also recommended. Conferences for parents and educators should encourage the discussions of students' goals in both academic and non-academic domains. Termly discussion between parents, educators and students can help parents and educators understand the kind of support needed for students.

In conclusion, different learning environment such as learning centres, home and school, have resulted in the co-existence of multiple contributing factors which either help or impede learning in dyslexic students. Since a child's development is affected by the interaction between multiple layers of the surrounding environment (Mcleod, 2023), it is therefore important for educators, parents and students to come together and discuss these factors so as to help these students reach their truest potential.

REFERENCES

Adams, G., & Carnine, D. (2003). Direct instruction. *Handbook of Learning Disabilities,* ed. H Swanson, K Harris, S Graham, 403 – 416. New York: Guilford.

Alchemer. (2010). *Qualitative & Quantitative Research: Which to Use?* Available at: https://www.alchemer.com/resources/blog/quantitative-qualitative-research/. (accessed: 19.05.2023).

Al-Lamki, L. (2012). 'Dyslexia: Its impact on the individual, parents and society', *Sultan Qaboos University Medical Journal, 12*(3), 269 – 272. Available at: https://doi.org/10.12816/0003139.

Beaujean, A. A., Benson, N. F., McGill, R. J., & Dombrowski, S. C. (2018). 'A misuse of IQ scores: Using the dual discrepancy/ consistency model for identifying specific learning disabilities', *Journal of Intelligence, 6*, 1 – 25. Available at: https://doi.org/10.3390/jintelligence6030036.

Blachman, B. (1997). *Early intervention and phonological awareness: A Cautionary Tale*, Mahwah, NJ: Erlbaum.

Braun, V., & Clarke, V. (2006). 'Using thematic analysis in psychology', *Qualitative Research in Psychology, 3*(2), pp. 77 – 101.

Brilleslyper, M., Ghrist, M., Holcomb, T., Schaubroeck, B., Warner, B., & Williams, S. (2012). 'What's the point? The benefits of grading without points', *PRIMUS, 22*(5), pp. 411 – 427. Available at: http://dx.doi.org/10.1080/10511970.2011.571346.

Burden, R., & Burdett, J. (2005). 'Factors associated with successful learning in pupils with dyslexia: A motivational analysis', *British Journal of Special Education, 32*(2), pp. 100 – 104.

Carroll, J. M., & Iles, J. E. (2006). 'An assessment of anxiety levels in dyslexic students in higher education', *British Journal of Educational Psychology, 76*, pp. 651 – 662.

Castillo-Montoya, M. (2016). 'Preparing for interview research: The interview protocol refinement framework', *The Qualitative Report, 21*(5), pp. 811 – 831.

Csizér, K., Kormos, J., & Sarkadi, A. (2010). 'The dynamics of language learning attitudes and motivation: Lessons from an interview study of dyslexic language learners', *The Modern Language Journal, 94*(3), 470 – 487.

Dahlgren, L. O., Fejes, A., Abrandt-Dahlgren, M., & Trowald, N., (2009). 'Grading systems, features of assessment and students' approaches to learning', *Teaching in Higher Education, 14*(2), 185 – 194. Available at: http://dx.doi.org/10.1080/13562510902757260.

D'Agostino, J., & Murphy, J. (2004). 'A meta-analysis of reading recovery in United States schools', *Educ. Eval. Policy Anal., 26*, 23 – 28.

Demirel, M. (2009). 'Lifelong learning and schools in the twenty-first century', *Procedia – Social and Behavioral Sciences, 1*(1), 1709 – 1716. Available at: http://dx.doi.org/10.1016/j.sbspro.2009.01.303.

Dyslexia Association of Singapore, (2019). *What is Dyslexia?* Available at: https://www.das.org.sg/about-dyslexia/what-is-dyslexia/what-is-dyslexia.html. (accessed: 21.04.2023).

Dyslexia Association of Singapore, (2022). *Main Literacy Programme (MLP).* Available at: https://www.das.org.sg/services/programmes/main-literacy- programme.html (accessed: 12.04.2022).

Einarsdóttir, J. (2007). 'Research with children: Methodological and ethical challenges', *European Early Childhood Education Research Journal, 15*(2), 197 – 211.

Faudzi, I. S. B. M. A., & Cheng, J. L. A. (2022). 'Knowledge of dyslexia among teacher trainees in Malaysia', *Journal of Cognitive Sciences and Human Development, 8*(2), 54 – 76.

Fink, R. P. (1995). 'Successful dyslexics: A constructivist study of passionate interest reading',

Journal of Adolescent & Adult Literacy, 39(4), 268 – 280.

Ferrer, E., Shaywitz, B. A., Molahan, J. M., Marchione, K., & Shaywitz, S. E. (2010). 'Uncoupling of reading and IQ over time: Empirical evidence for a definition of dyslexia', *Psychological Science, 21*(1), 93 – 101.

Flecher, J. M., Lyon, G. R., Fuchs, I. S., & Barnes, M. A. (2007). *Learning disabilities: From identification to intervention.* New York: Guilford.

Foorman, B., Francis, D., Fletcher, J., Schatschneider, C., & Mehta, P. (1998). 'The role of instruction in learning to read: Preventing reading failure in at-risk children', *J. Educ. Psychol., 90*, 37– 55.

Friend, A., Defries, J. C., & Olson, R. K. (2008). 'Parental education moderates genetic influences on reading disability', *Psychol. Sci., 19*, 1124 -1130.

Fuchs, D., & Fuchs, L. (2005). 'Peer-assisted learning strategies: Promoting word recognition, fluency and reading comprehension in young children', *J. Spec. Educ., 39*, 34 – 44.

Gagliano, A., Siracusano, R., Boncoddo, M., Calarese, T., Ilardo, G., Fidi, D., Grosso, R., Lamberti, M., Ciuffo, M., Rosina, S., Cedro, C., & Germanò, E. (2014). 'Personality profiles of dyslexic children: A study with the big five questionnaire', *Life Span and Disability, 17*(1), 7 – 24.

Gallagher, M. (2008). ''Power is not an evil': Rethinking power in participatory methods', *Children's Geographies, 6,* 137 – 150.

Glaser, B. G., & Strauss, A. L. (1967). The Discovery of Grounded Theory: Strategies for Qualitative Research, Aldine Transaction. Available at: https://doi.org/10.1097/00006199-196807000-00014.

Goodacre, K., & Sumner, E. (2020). 'Overcoming the hurdles: Understanding motivation and supporting adult learners with poor literacy and dyslexia in the homeless sector', WILEY, 27, 79 – 93.

Graham, A., Powell, M. A., & Taylor, N. (2015). 'Ethical research involving children: Putting the evidence into practice', *Family Matters, 96*, 23 – 28.

Hadhrami, A. S. AL., Al-Amrat, M. G. R., Khasawneh, M. A. S., & Darawsheh, S. R. (2022). 'Approach to improve reading skill of students with dyslexia', *Information Sciences Letters, 11*(6), 2333 – 2338.

Haft, S. L., Duong, P. H., Ho, T. C., Hendren, R., & Hoeft, F. (2019). 'Anxiety and attentional bias in children with specific learning disorders', *Journal of Abnormal Child Psychology, 47*, 487 – 497.

Hewes, D. G. (2020). 'Entrepreneurs with dyslexia in Singapore: The incidence, their educational experiences and their unique attributes', *Asia Pacific Journal of Developmental Differences, 7*(2), 157 – 198.

Higher Education Academy, (2015). *Grade Point Average: Report of the GPA Pilot Project 2013 – 14,* 1 – 44, York: Higher Education Academy.

Holland, S., Renold, E., Ross, N., & Hillman, A. (2010). 'Power, agency and participatory agendas: A critical exploration of young people's engagement in participative qualitative research', *Childhood, 17*, 360 – 375.

Jacobs, J. L., Samarasekera, D. D., Shen, L., Rajendran, K., & Hooi, S. C. (2014). 'Encouraging an environment to nurture lifelong learning: An Asian experience', *Medical Teacher, 36*(2), 164 – 168. Available at: http://dx.doi.org/10.3109/0142159X.2013.852168.

Kaluyu, V., & Ooko, P. (2016). 'The relationship between writing dyslexia and academic performance of upper primary pupils in public schools in Changamwe sub-county, Kenya', *International Journal of Social Science Studies, 4*(10). Available at https:// doi.org/10.11114/ijsss.v4i10.1867.

Kesherim, R. (2023). *31 Learning Disabilities Statistics & Facts.* Available at https://www.supportivecareaba.com/statistics/learning-disabilities. (accessed: 12.04.2023).

Lane, D., Blank, J., & Jones, P. (2009). 'Research with children: Context, power, and representation', *The Qualitative Report, 24*(4), 693 – 704.

Lefley, D. L., & Pennington, B. F. (1991). 'Spelling errors and reading fluency in compensated adult dyslexics', *Ann. Dyslexia, 41*, 143 – 162.

Łodygowska, E., Chęć, M., & Samochoweic, A. (2017). 'Academic motivation in children with dyslexia', *The Journal of Educational Research, 110*(5), 575 – 580.

Lopes, J. A., Gomes, C., Oliveira, C. R. and Elliott, J. G. (2020). 'Research studies on dyslexia: Participant inclusion and exclusion criteria', *European Journal of Special Needs Education, 35*(5), 587 – 602. Available at: https://doi.org/10.1080/08856257.2020.1732108.

Lowyck, J., Lehtinen, E., & Elen, J. (2004). 'Students' perspectives on learning environments', *International Journal of Educational Research, 41*(6), 401 – 406.

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.

Maunsell, M. (2020). 'Dyslexia in a global context: A cross-linguistic, cross-cultural perspective', *Latin American Journal of Content, Language Integrated Learning, 13*(1), 92 – 113.

Maurer-Smolder, C., Hunt, S., & Parker, S. B. (2021). 'An exploratory study of students with dyslexia in a mixed online and on-campus environment at an Australian regional university', *Australian Journal of Learning Difficulties, 26*(2), 127 – 151. Available at: https://www.tandfonline.com/action/showCitFormats?doi=10.1080/19404158.2021. 1991406 .

Mcleod, S. (2023). *Bronfenbrenner's Ecological Systems Theory.* Available at: https://www.simplypsychology.org/bronfenbrenner.html. (accessed: 18.04.2023).

Mcleod, S. (2023). *Qualitative Vs Quantitative Research: Methods & Data Analysis.* Available at: https://www.simplypsychology.org/qualitative- quantitative.html. (accessed: 19.05.2023).

Ministry of Education, (2024). *Curriculum for secondary schools.* Available at: https://www.moe.gov.sg/secondary/schools-offering-full-sbb/schools-with- specialised-curriculum (accessed: 18.11.2024).

Moriña, A. (2019). 'The keys to learning for university students with disabilities: Motivation, emotion and faculty-student relationships', *PLoS One, 14*(5), 1 – 15.

Nanavati, C. (2015). 'Mummy', not 'Mommy': An Expat's Guide to Surviving Primary School in Singapore. Available at: https://www.sassymamasg.com/expats- guide-surviving-primary-school-singapore/. (accessed: 17.04.2023).

Nalavany, B. A., & Carawan, L. W. (2011). 'Perceived family support and self- esteem: The mediational role of emotional experience in adults with dyslexia', *DYSLEXIA, 18*, 58 – 74.

Nur, S., Zulkifli, M., & Hestiana, H. (2022). 'Students' interest in reading English texts', International Conference: Transdisciplinary Paradigm on Islamic Knowledge, *KnE Social Science*, 148 – 157.

O'Brien, B. A., Soon, T. C., & Habib, M. (2023). 'Response and non-response to intervention for reading difficulties: What role do cognitive correlates play?' *Asia Pacific Journal of Developmental Differences, 10*(2), pp. 187 – 210.

O'Connor, R. (2000). 'Increasing the intensity of intervention in kindergarten and first grade', *Learn. Disabil. Res. Pract., 15*, 43 – 54.

Peterson, R. L., & Pennington, B. F. (2015). 'Developmental dyslexia', *Annu. Rev. Clin. Psychol., 11*, 284 – 307.

Pippin, T. (2014). 'Roundtable on pedagogy: Response: Renounce grading?', *Journal of the*

American Academy of Religion, 82(2), 348 – 355. Available at: http://dx.doi.org/10.1093/jaarel/lfu002.

Pitt, S. & Soni, A. (2018). 'Students' experiences of academic success with dyslexia: A call for alternative intervention', *Support for Learning, 32*(4), 387 – 405.

Pool, J., & Ansems, L. (2022). *Grounded Theory.* Available at: https://www.leidenlawmethodsportal.nl/topics/grounded- theory#:~:text=Using%20grounded%20theory%20as%20an,qualitative%20data%2 C%20including%20grounded%20theory. (accessed: 28.05.2023)

Ramus, F. (2003). 'Developmental dyslexia: Specific phonological deficit or general sensorimotor dysfunction?', *Current Opinion in Neurobiology, 13*(2), 212 – 218.

Rappolt-Schlichtmann, G., Boucher, A. R., & Evans, M. (2018). 'From deficit remediation to capacity building: Learning to enable rather than disable students with dyslexia', *Language, Speech, and Hearing Services in Schools, 49*, 864 – 874.

Reid, G. (2011). *Dyslexia.* 3rd edn. London, England: Continuum International Publishing.

Rep. Natl. Reading Panel (2000). Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction. U.S. Dept. Health Human Serv., Public Health Serv., Natl. Inst. Health, Natl. Inst. Child Health Human Dev, Washington, DC.

Ruslin, Mahsuri, S., Rasak, M. S. A., Alhabsyi, F. and Syam, H. (2022). 'Semi- structured interview: A methodological reflection on the development of a qualitative research instrument in educational studies', IOSR Journal of Research & Method in Education (IOSR-JRME), 12(1), pp. 22 – 29.

Schinske, J., & Tanner, K. (2014). 'Teaching more by grading less (or differently)', *CBE – Life Sciences Education, 13*(2), pp. 159 – 166.

Schneider, J., & Hutt, E. (2013). 'Making the grade: A history of the A – F marking scheme', *Journal of Curriculum Studies, 46*(2), pp. 201 – 224.

Sercenia, J. C., Ibañez, E. D., & Pentang, J. T. (2023). 'Thinking beyond thinking: Junior high school students' metacognitive awareness and conceptual understanding of integers', *Mathematics Teaching Research Journal, 15*(1), 4 – 24.

Shaywitz, S. E., Morris, R., & Shaywitz, B. A. (2008). 'The education of dyslexic children from childhood to young adulthood', *Annu. Rev. Psychol., 59*, 451 – 475.

Simmons, D., Kame'enui, E., Stoolmiller, M., Coyne, M., Harn, B. (2003). *Accelerating growth and maintaining proficiency: A two-year intervention study of kindergarten and first grade children at risk for reading difficulties.* Baltimore, MD: York.

Snowling, M. J., & Hulme, C. (2012). 'Annual research review: The nature and classification of reading disorders – A commentary on proposals for DSM – 5', *The Journal of Child Psychology and Psychiatry, 53*(5), 593 – 607.

Stoeber, J. (2018b). 'The psychology of perfectionism: An introduction. In J. Stoeber (Ed.)', *The Psychology of Perfectionism: Theory, Research and Applications*, 3 – 16, London: Routledge.

Stoeber, J., & Rountree, M. L. (2020). 'Perfectionism, self-stigma, and coping in students with dyslexia: The central role of perfectionistic self-presentation', *Wiley, 27*, 62 – 78.

Stoodley, C. J., & Stein, J. F. (2012). 'Cerebellar function in developmental dyslexia', *The Cerebellum, 12*(2), pp. 267 – 276.

Tanaka, H., Black, J. M., Hulme, C., Stanley, L. M., Kesler, S. R., Whitfield- Gabrieli, S., Gabrieli, J. D. E., & Hoeft, F. (2011). 'The brain basis of the phonological deficit in dyslexia is independent of IQ', *Psychol Sci, 22*(11), 1442 – 1451.

Tippin, G. K., Lafreniere, K. D., & Page, S. (2012). 'Student perception of academic grading: Personality, academic orientation, and effort', *Active Learning in Higher Education, 13*(1), 51 – 61. Available at: http://dx.doi.org/10.1177/1469787411429187.

Tocci, C. (2010). 'An immanent machine: Reconsidering grades, historical and present', *Educational Philosophy and Theory, 42*(7), 762 – 778.

Toh, L. (2018). *Support programmes available for small groups of students with dyslexia.* Available at: https://www.moe.gov.sg/news/forum-letter- replies/20180326-support-programmes-available-for-small-groups-of-students- with-dyslexia. (accessed: 17.04.2023).

Tops, W., Callens, C., Cauwenberghe, E. V., Adriaens, J., & Brysbaert, M. (2012). 'Beyond spelling: The writing skills of students with dyslexia in higher education', *Reading and Writing, 26,* 705 – 720.

Tops, W., Verguts, E., Callens, M. & Brysbaert, M. (2013). 'Do students with dyslexia have a different personality profile as measured with the Big Five?', *PLoS One, 8*(5), e64484.

Torgesen, J., Wagner, R., Rashotte, C., Rose, E., Lindamood, P., Conway, T., & Garvan, C. (1999). 'Preventing reading failure in children with phonological processing difficulties: Group and individual responses to instruction', *J. Educ. Psychol., 81*, 579 – 593.

Treiman, R., Hulslander, J., Olson, R. K., Willcut, E. G., Byrne, B., & Kessler, B. (2019). 'The unique role of early spelling in the prediction of later literacy performance', *Scientific Studies of Reading, 23*(5), 437 – 444.

Turner, R. J., Frankel, B. G., & Levin, D. M. (1983). 'Social support: Conceptualization, measurement, and implications for mental health', *Research in Community Mental Health, 3*, 67 – 111.

Turner, R. J., Sorenson, A. M., & Turner, J. B. (2000). 'Social contingencies in mental health: A seven-year follow-up study of teenage mothers', *Journal of Marriage and the Family, 62*, 777 – 791.

Vaughn, S., Linar-Thompson, S., & Hickman, P. (2003). 'Response to treatment as a way of identifying students with learning disabilities', *Except. Child., 69*, 391 – 409.

Vellutino, F. R., Scanlon, D. M., Small, S., & Fanuele, D. P. (2006). 'Response to intervention as a vehicle for distinguishing between children with and without reading disabilities: Evidence for the role of kindergarten and first-grade interventions', *J. Learn. Disabil., 39*, 157 – 169.

Wadsworth, S. J., Olson, R. K., & DeFries, J. C. (2010). 'Differential genetic etiology of reading difficulties as a function of IQ: An update', *Behav. Genet., 40*, 751 – 758.

Wajuihian, S. O., & Naidoo, K. S. (2011). 'Dyslexia: An overview', *African Vision and Health, 70*(2).

Wang, R., Chen, L., & Solheim, I. (2020). 'Modeling dyslexic students' motivation for enhanced learning in e-learning systems', *ACM Transactions on Interactive Intelligent Systems, 10*(3), Article 21.

Xiao, P., Zhu, K., Feng, Y., Jiang, Q., Xiang, Z., Zhang, Q., Wu, X., Fan, Y., Zou, L., Xiao, H., & Song, R. (2023). 'Associations between dyslexia and children's mental health: Findings from a follow-up study in China', *Psychiatry Research, 324*, 115188.

Yong, T. L., Kew, C. S., Fen, H. C., & Begum, A. T. (2020). *A Review of Metacognition: Implications for Teaching and Learning (NIE Working Paper Series No. 17)*. Singapore: National Institute of Education.

Zhou, Q. (2023). 'How does dyslexia influence academic achievement', Proceedings of the 2022 2nd International Conference on Modern Educational Technology and Social Sciences (ICMETSS 2022), *ASSEHR 693*, 861 – 868.

Zisimopoulos, D. A., & Galanaki, E. P. (2009). 'Academic intrinsic motivation and perceived academic competence in Greek elementary students with and without learning disabilities', *Learning Disabilities Research & Practice, 24*(1), 33 – 43.

Efficacy of teaching practices in online English comprehension lessons for learners with Specific Learning Differences (SpLD): A qualitative analysis

Tuty Elfira Abdul Razak[1][*], Siti Halimah Binte Mohamed Yahaya[1], Joanne Tan Shi Huey[1] and Andy Wang Dingxiong[1]

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 (SpLDs) in their school and national examinations. With the introduction of online teaching and virtual lessons in 2020, the programme has integrated the use of video lessons and online educational applications to deliver the same curriculum. This qualitative study aims to assess the efficacy of teaching practices through the use of online teaching tools and teachers' questioning techniques, and how they promote students' learning by observing their engagement and application of learnt skills in online classrooms. The findings of this research have implications for educational therapists by offering valuable insights into enhancing teaching methods through a strategic fusion of teaching tools and questioning techniques

Keywords: PSLE English Paper 2, dyslexia, specific learning differences, English, exam preparation,

***** *Correspondence to:*
Tuty Elfira Abdul Razak, DAS Lead Educational Therapist, Prep 2 PSLE Programme Manager, Specialised Educational Services, a Division of the Dyslexia Association of Singapore. Email: tuty@das.org.sg

INTRODUCTION

The emergence of new inquiries into the subject of online learning has since gained prominence in response to the impact of the COVID- 19 pandemic around the world (Gustiani, 2020; Knopf, Stumpp & Michelis, 2021). The sudden shift from traditional classrooms to virtual ones compelled educators to deliver lessons remotely through various applications on virtual platforms, often without any prior experience or training (Lennox et al., 2021). As the global landscape returns to the normalcy of conventional classrooms, educators and school leaders deliberate on the possibility of continued learning through the virtual platforms. Undoubtedly, online learning offers numerous advantages. It provides accessibility to tune in to lessons at any location which minimises travel time and financial expenditures. However, deliberation is done cautiously knowing that there is limited discourse on students' engagement in online learning (Lazareva, 2018). This is evident especially in the field of Specific Learning Differences (SpLD), where students face differences or difficulties with particular aspects of learning, resulting from neurodevelopmental disorders that often affect one's ability to receive, process, and recall information (Dyslexia Association of Singapore, 2023).

Learners with SpLD, including those with Dyslexia and Specific Language Impairment (SLI), face challenges in acquiring and understanding language and literacy, due to difficulties with phonological processing, working memory, attention, organisation, sequencing, and executive functioning. Understanding these differences is crucial for educators and support professionals, as it helps them tailor instructional strategies and interventions to meet the specific needs of students with SpLD (British Dyslexia Association, 2017).

Prep 2 PSLE Programme

The Prep 2 PSLE programme was developed in 2013 to support students beyond literacy intervention at the Dyslexia Association of Singapore (DAS). It aims to help learners prepare for the English language paper of the Primary School Leaving Examination (PSLE), taken at the end of the final year of Primary school education. Previous studies (Leong, 2015; Leong, Asjamiah & Wang, 2017; Razak, See, Tan & Leong, 2018; Razak, Asjamiah, Wang & Leong, 2021) have demonstrated that the Prep 2 PSLE programme is effective in addressing the examination needs of this group of learners through an explicit and systematic teaching methodology.

All programmes at DAS, including Prep 2 PSLE, subscribe to the Orton-Gillingham (OG) approach for its dyslexia remediation and intervention (Leong, Asjamiah & Wang, 2017). A key feature of the OG approach is its simultaneously multisensory instruction which engages students through visual, auditory, kinesthetic and tactile (VAKT) sensory activities to help them learn and remember information more effectively. Each lesson in the Prep 2 PSLE programme is guided by the R-I-M-A-I-R structure in Table 1 which emphasises a

review of concepts and skills taught previously and during the lesson and gives opportunities for teachers to teach new concepts or skills by modelling them explicitly and enable them to monitor students' understanding through semi-independent and independent application.

Table 1: R-I-M-A-I-R Approach

R	Review of previously taught concepts
I	Introduction of new topic/ concept / skill / strategy
M	Modelling of how concept / strategy is applied in questions
A	Application of concept / strategy by students with teachers' guidance
I	Independent application of concept / strategy by students
R	Recap of the topic / concept / skill / strategy taught

The study by Leong et al. (2017) on effective classroom practices in the Prep 2 PSLE programme (formerly known as English Exam Skills Programme) also illustrated that the consistent use of the RIMAIR lesson structure and VAKT (Visual; Auditory; Tactile; Kinesthetic) elements by the teacher supports student engagement and promotes better retention, thereby enhancing students' learning processes. The Prep 2 PSLE programme is postulated to benefit all learners, encompassing those facing challenges in their learning, regardless of whether they are diagnosed with SpLD or experiencing other learning difficulties (Razak et al, 2018).

LITERATURE REVIEW

Traditional and online learning

Traditional in-person teaching in a physical classroom setting allows teachers to assess students' understanding of concepts through non-verbal cues and make adjustments to their instruction accordingly. According to a Harvard study (Wasserman, 2019), students expressed that they learned more through in-person lectures that employed active learning strategies. These include classroom techniques such as getting students to answer questions and assigning the class to work in groups, and they were found to produce better educational outcomes. Additionally, the social environment of traditional classrooms engages students to use their physical senses to learn, enhance their soft skills and increase student interaction.

Daloiso (2017) suggested that traditional and one-size-fits-all approaches to language teaching are usually ineffective for learners with dyslexia. Teachers should instead have a range of strategies to respond to individual learners' needs by integrating technology and subscribing to more structured, gradual and explicit teaching methods. Hence, classroom accommodations, through the use of different learning tools and multisensory approaches, are beneficial in the learning process (Cimermanova, 2015).

Nijakovska et al. (2013) recommended seven ways in which SpLD learners can be accommodated in the classroom for language learning:

1.   Using explicit instructions and teaching procedures
2.   Simplify lesson materials
3.   Organise information and lesson content
4.   Provide additional support and practice
5.   Encourage peer mediated interaction and learning
6.   Using multisensory approach
7.   Giving individualised approach

Through consistent implementation of these techniques, struggling learners or those with SpLDs can significantly improve their English comprehension and become more successful learners. Lama (2019) recommends that teachers must also undergo consistent training and embrace innovative approaches to shift from traditional teaching methods to a contemporary style where students take an active role in their learning. They should encourage students to explore the lesson's content, take an active role in meaning-making by integrating technology, so that they will see learning as something that motivates them.

Literature has shown that when equipped with certain characteristics and skills, learners can also be successful and satisfied with online learning. In online environments, the importance of students' self-regulation, motivation, and favourable learning attitudes become more pronounced and significant (Chiu, 2021). These favourable learning attitudes encompass self-regulation skills, self-discipline, adept time management, organisational abilities, planning capabilities, and the capacity for self-evaluation (Eom, Wen & Ashill 2006; Kerr, Rynearson & Kerr 2006; Muilenburg & Berge 2005; Ruey 2010).

Successful online students often exhibit reflective or visual learning styles (Eom, Wen, & Ashill 2006; Means et al. 2010) and an internal locus of control (Berenson, Boyles, & Weaver 2008). Additionally, Emotional Intelligence (EI) plays a crucial role in the realm of online learning as it is common for students to experience frustration due to technological challenges or difficulties in grasping information when immediate feedback or assistance is not available. Students who can manage their emotions and seek appropriate help before reaching a state of frustration are more likely to maintain control over their learning (Berenson, Boyles, & Weaver 2008).

Student Engagement

Student engagement is defined by the amount of time and effort that learners dedicate and invest in the processes of learning, with extensive inquiry into this field spanning from quantitative to qualitative studies (Kuh, 2003). The great interest in this domain of student engagement stems from its perceived positive correlation to academic grades (Tross, Harper, Osher & Kneidinger, 2000; Reyes, Brackett, Rivers, White & Salovey, 2012). These studies show that the more engaged learners are, the better they perform in classrooms and assessments (Lei et al., 2018). Being more engaged also resulted in lower drop-out rates in schools (Archambault et al., 2009, Szabó, Zsolnai & Fehérvári, 2024). While student engagement largely stems from the effort that students invest in their own learning, it is also influenced by various external factors, making it a malleable aspect of education (Fredricks et al., 2004; Lawson & Lawson, 2013). Positive changes in factors such as teaching practices and environment can significantly enhance student engagement. The findings of these studies have great relevance to educators and their teaching practices in classrooms. Besides its impact on academic grades, learners who were engaged in learning were also found to be more motivated to invest their time in learning and became more persistent (Gettinger & Walter, 2012).

Given its positive impact on learning, researchers have investigated the multifaceted nature of student engagement. While there is no common consensus to the number of definitive sets to student engagement, there are three widely accepted and distinct domains- behaviour, cognitive and affective engagement, with extensive inquiries done on each domain (Fredricks et. al., 2004)

Researchers have defined and characterised each domain in the following ways:

- ♦   **Behavioural Engagement** refers to learners' explicit behaviours that can be observed through their participation, performance and completion of tasks.

- ♦   **Cognitive engagement** explores learners' purpose and motivation to learn, critical thinking and their ability to comprehend complex ideas.

- ♦   **Emotional engagement** looks into learners' attitudes and the way they interact with their teachers and peers.

However, Fredricks et. al (2004) brought forth the notion that these domains should not be viewed as individual domains. Viewing them as separate entities would not provide a holistic understanding of learners' characterization. Instead, in the real-life context of classrooms and learning, student engagement is an interlinked web of a student's behaviour, cognition and emotion. Understanding the interplay of these domains and moulding lessons to increase engagements would optimise learners' performance.

However, this could be a challenge for learners with SpLD as they present a distinct set of challenges. These learners commonly face academic hurdles which could significantly impact engagement. It is imperative to recognize that the conditions and domains that work for typical learners may not necessarily work the same for learners with SpLD. As such, it warrants researchers' attention to further delve into the distinct set of needs of these learners.

There have been numerous studies exploring the relationship between the impact of SpLD on learners' engagement. While some have shown a negative correlation, other studies have found no significant impact. Moreira et al. (2018) argues that the reason for the inconclusive outcome of these studies is due to the differences in the way that engagement is being conceptualized. Perez-Salas' et al. (2021) study revealed that learners with Specific Educational Needs (SEN) were found to have higher disengagement in the behavioural and cognitive dimensions. However, learners with SEN presented higher engagement in the affective dimension as they rated themselves comparatively high in their relationship with their teachers. These studies provide a critical lens into the varying domains of student engagement among learners with SpLD.

Questioning Techniques

Questioning refers to the act of teachers asking questions in a classroom setting in order to promote student thinking, interaction, and participation in processing knowledge (Phan & Nguyen, 2021). Questioning techniques play a crucial role in the classroom, significantly influencing students' understanding and knowledge acquisition (Matra, 2014; Davoudi & Sadeghi, 2015).

Instead of only answering questions, students' learning experience can also be enhanced during comprehension lessons by generating questions. Research by Wibobo et. al. (2020) on strategies in teaching reading comprehension found that the majority of strategies employed by the English teachers were Question Generating and Question Answering- the former requires students to ask questions while reading the text whereas the latter requires students to respond to their teachers' questions. In the process, students are prompted to think critically as they are guided on how to locate information, analyse text structures and apply inference skills where appropriate.

Effective questioning stimulates student interest and curiosity, actively engaging them in the learning process and positively influences student learning, interaction, and communicative competence (Matra, 2014, Davoudi & Sadeghi, 2015; Wangru, 2016; Cárdenas, 2021). Particularly in the aspect of reading comprehension, teachers' questions were found to improve readers' comprehension level of passages (Davoudi & Sadeghi, 2015). Interviews with students revealed positive feedback, highlighting the efficacy of questioning techniques employed by teachers in enhancing their reading comprehension skills (Phan & Nguyen, 2021).

The types of questions used by teachers are paramount as they can elevate students' comprehension levels and contribute to the construction of new knowledge (Matra, 2014). Cárdenas (2021) distinguishes between two groups of questions: low-level questions assess understanding from given information and high-level questions that promote interaction and critical thinking. While both are deemed necessary, the latter encourages the co-construction of knowledge from the content of the passages as well as the comprehension skills (Cárdenas, 2021). In line with this, Nguyen and Nguyen (2023) provided further details on these groups- low-level questions consist of recall questions, display questions and classroom management questions whereas high-level questions hold the objective of encouraging conversations and improving students' critical thinking skills. High-level questions, also termed as referential or creative questions, may not have a standardised answer (Nguyen & Nguyen, 2023; Al-Zahrani & Al-Bargi, 2017; Wangru, 2016). These questions also require students to engage in higher order cognitive processes and promote reflection and metacognition (Raslie, Mikeng & Ting, 2015).

High-level questions, such as those with 'how' and 'why', stretch students beyond the explicit meaning of the text (Blything, Hardie, & Cain, 2020). These questions may also prompt students to incorporate their background knowledge or schema to engage in deeper levels of thinking and understanding. Anderson (1977) likens schema to a form of abstract representation, where readers can activate background knowledge to comprehend a text. In describing how to apply schema theory in teaching reading comprehension, Ren (2023) argued that reading involves constant interaction between one's schema and the texts. Teachers can guide readers to process and interpret new information better by linking the information to the readers' prior knowledge and cultural background, reflecting on past experiences and organising these experiences to bridge the gap between existing knowledge and the unknown details of the comprehension passage. By doing so, learners are trained to corroborate and predict textual content, and to gain a deeper appreciation and understanding of the text beyond surface level reading.

Despite these, most teachers tend to ask lower-level questions in class (Tofade, Elsner & Haines, 2013). This is consistent with Davoudi & Sadeghi's (2015) finding that the most dominant type of questions was display questions, which were used for the purpose of eliciting information or checking learners' understanding. Nonetheless, both types of questions play important roles in the learning process, and a balanced approach that incorporates both high-level and low-level questioning can provide a comprehensive and effective learning experience for students (Raslie, Mikeng & Ting, 2015).

Harvey (2008) emphasized that teachers need to be intentional in planning and executing questioning strategies such that the intended learning outcomes for the questions posed must be clear and beneficial to the learners. Applying questioning techniques effectively also enables readers to be fully immersed in the reading process. Sujariati, Rahman and Mahmud (2016) summed up the benefits of asking effective

questions- learners are able to apply critical thinking skills, construct new meanings and make new connections with the text, gain a deeper level of comprehension and appreciation of what they are reading, and be motivated to be involved in the learning process. As such, it is vital that teachers plan and apply questioning strategies in the most effective way so that it achieves its maximum outcomes.

For students with SpLDs such as dyslexia or ADHD, questioning techniques have been suggested to be effective in enhancing their English comprehension by providing necessary scaffolding and support to overcome their unique challenges (Rupley, Blair, & Nichols, 2009; Raslie, Mikeng & Ting, 2015). The use of strategic and targeted questions encourages student engagement, making their learning experience a more active and meaningful learning process. These techniques help to foster critical thinking skills, encourage deeper understanding, and promote effective communication. By asking open-ended questions, teachers create opportunities for students to express their thoughts and interpretations, facilitating the development of their language skills.

RESEARCH AIM

While there is existing research that primarily focused on intrinsic learner characteristics that contributed to successful online learning for neurotypical learners (Eom, Wen & Ashill 2006; Kerr, Rynearson & Kerr 2006; Muilenburg & Berge 2005; Ruey 2010), there has yet to be sufficient research done on the external factors that could have an impact on students' engagement specifically on primary school learners with SpLD. Hence, the current research aims to explore the efficacy of teaching practices on students' learning and engagement, in the context of online learning for students with SpLD in the Prep 2 PSLE programme. The focus on teaching practices includes questioning strategies, gestures and nonverbal cues.

This study was guided by the following research questions:

- How do students exhibit engagement across the three domains (behavioural, cognitive and emotions) during online Prep 2 PSLE lessons?

- What are the teaching practices adapted by the teachers to meet the needs of SpLD learners during online Prep 2 PSLE lessons?

- How do teaching practices influence the engagement and comprehension outcomes of learners with SpLD in Prep 2 PSLE online lessons?

The findings of this research will offer a unique perspective for educators and school leaders, helping them in making informed decisions to engage teachers in continued professional development.

METHODOLOGY

Participants

This qualitative study was conducted by observing two recorded online classroom lessons taught by two different Prep 2 PSLE educational therapists. These classes are conducted on a weekly one-hour lesson via a synchronous online learning mode through Zoom. Both therapists are trained to deliver lessons in accordance with the RIMAIR teaching approach developed by the programme (Leong, Asjamiah & Wang, 2017). A total of 2 educational therapists and 5 students, aged between 11 and 12 participated in this study. Of the 5 students, one of them has a diagnosis of Speech and Language Impairment (SLI) while the other 4 students are diagnosed with Dyslexia. Both recorded lessons centre on enhancing comprehension skills, with both teachers employing identical materials and worksheets.

Data Collection

a. Classroom observations

Two online lessons were recorded to analyse the lesson delivery, teaching practices and students' engagement. Each lesson was 1 hour long, covering the same content on comprehension.

b. Student worksheets

During the lesson, students were given a link to their individual online worksheets. They typed their responses on these worksheets, which were analysed to assess their application of learnt concepts.

c. Online learning tools

Both teachers employed the use of similar online teaching tools. All students logged into the lesson Zoom, facilitating the learning through live video conferencing. As the teachers delivered the lesson, the screen continued to display videos of students, enabling real-time monitoring of their engagement. The comprehension worksheets with embedded links and quizzes were used by both teachers on Classkick. The use of Classkick enabled interactive learning and real-time supervision. Teachers were able to assess whether students were on-task by viewing their individual worksheets while they were typing in their responses. At the same time, teachers can also provide timely feedback and target specific areas for improvement. Additionally, the collaborative functions allowed teachers and students to work together on the same worksheet at the same time, and teachers can assist students with classkick functions when needed. Teaching online also

allows teachers to seamlessly integrate videos and search engines during the lesson to reinforce the content of the lesson. In particular, to prepare the students for the content of the comprehension passage, a video was shown on youtube which highlighted a hiker's experience. This provided students with some real-life scenarios that further aided their overall understanding of the passage and formed connections with the text presented.

Data Analysis

Engagement for Learning (EFL) framework

A framework is required to assess and code observations of student engagement. Recognizing the research gap where no existing framework holistically captures the various domains of student engagement—behavioural, cognitive, and emotional—along with their interplay with factors such as teaching practices and student application, the researchers designed the Engagement for Learning (EFL) framework (Annex A). The EFL was adapted from the Interactive Factors Framework (IFF) (Frith, 1999) which is a tool to analyse learner and teacher interactions as it helps to identify recurring patterns in classroom discourse and how teacher-dominated or student-centric interactions can influence learning outcomes. The EFL framework, on the other hand, not only measures students' application in written tasks but also provides insights into how teaching practices impact student engagement and how this engagement translates to practical application of acquired knowledge. As discussed earlier in the literature, this paper seeks to analyse three domains of engagement that have been widely accepted by researchers (Fredricks et al, 2004). Firstly, behavioural engagement which encompasses learners' visible actions and involvement in learning activities, such as staying focused, actively participating in discussions, and consistently completing assignments. Secondly, cognitive engagement delves deeper into the mental aspects of learning, addressing students' intrinsic motivations, critical thinking skills, and their ability to process and apply complex concepts. Emotional engagement refers to the learners' feelings, attitudes, and interpersonal connections within the online class, examining how positive relationships with the teachers and their peers, along with a sense of belonging and confidence, impact their enthusiasm and commitment to learning. Collectively, these domains would provide a comprehensive view of a student's engagement, reflecting an interplay of observable behaviours, mental involvement, and emotional well-being.

Structure of analysis

The researchers were divided into two teams. Researcher 1 (R1) and Researcher 2 (R2) observed the video recording of Teacher X's lesson, noting their individual observations based on the domains in the EFL. They then shared and consolidated their observations into a single EFL for Teacher X's class. Similarly, Researcher 3 (R3) and Researcher 4 (R4) watched the recording of Teacher Y's lesson, documented their observations using the

EFL domains, and merged their insights into one EFL for Teacher Y's class. Each pair of researchers also examined the links between the factors within the framework and discussed their interactions. This process resulted in one consolidated EFL for each teacher. The researchers then compared the two EFL frameworks to identify similarities and differences, as illustrated in Figure 1 below.
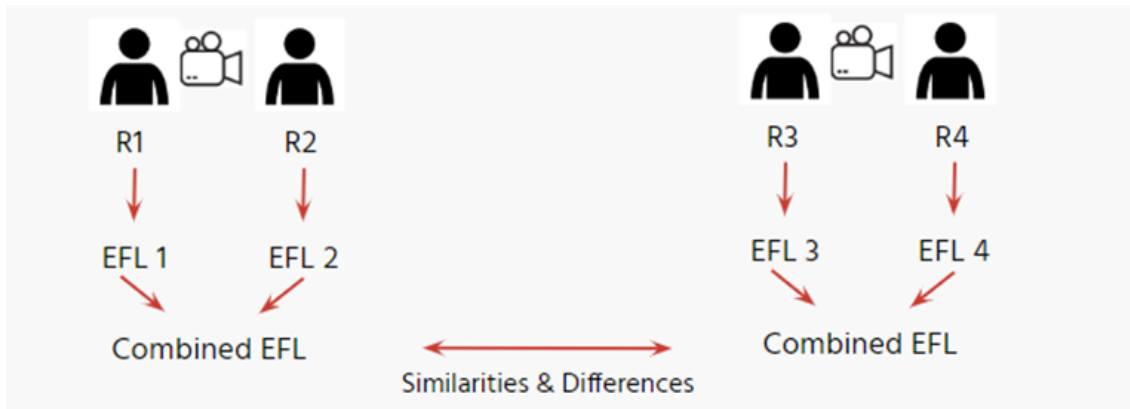

Figure 1: Process of Analysis

Besides documenting the observations in the EFL, the researchers also analysed the transcripts of both lessons and identified various questions posed during the lesson. These questions were then categorised as high level questions that promote critical thinking and low level questions which assess the understanding of information provided in the passage (Cárdenas, 2021 & Nguyen and Nguyen, 2023).

FINDINGS AND DISCUSSION

The current study sought to explore the efficacy of teaching practices on students' learning and engagement. In order to achieve this, the researchers observed the recorded video lessons and took note of the observations by indicating on the EFL framework. Interactions were drawn during analysis and explained in detail.

The data that was collected from the EFL of both Teachers X and Y clearly indicated interactions across various domains of student engagement. This is in line with the conceptual framework discussed in the literature review section of this paper. As highlighted by Fredricks et al. (2004), the behavioural, cognitive and emotional domains of student engagement are not isolated. Rather, they are interconnected through a web of links across the various domains. This suggests that in order to understand student engagement, it is necessary to view the three domains as part of an extensive network system. Teachers can create a more holistic and meaningful learning experience for their students if they do not view student engagement as separate entities. This interlinked

web of connections are evident in Teacher X and Y's classrooms where the domains interact fluidly which enhances students' engagement and their learning outcomes.

This interplay across domains extends beyond student engagement to teaching practices and students' application. For example, lessons that activates students' active participation showcases behavioural engagement. Active participation requires students' cognitive and emotional engagement as well. Understanding this would aid teachers in fostering a more engaging learning environment for their students. Teacher X and Y;s classroom practices illustrate the intertwined relationship across the various domains.

The figures presented in this study further demonstrate the web of connections between these engagement domains and teaching practices, visually capturing the complexity of these interactions. These diagrams reveal that engagement is not a linear process but rather an intricate network of influences that shape student outcomes. However, this paper focuses on several key connections that are particularly significant, as they demonstrate deeper and more extensive interactions across all domains. By exploring these critical connections, this study aims to provide a more comprehensive understanding of how engagement in the classroom is shaped by the dynamic relationships between behaviour, cognition, and emotion, and how these relationships extend to teaching practices and students' ability to apply what they learn. Through this discussion, the findings will offer insights into how teachers can leverage these connections to improve student engagement and overall learning outcomes. The discussion below also highlights how Teacher X and Teacher Y's teaching practices are uniquely tailored to their respective classes, particularly in how they elicit student responses and guide them toward comprehension and meaning-making. Despite these differences, what is most notable is the diverse methods they employ to engage students, effectively addressing all domains of learning.

As seen in Table 2, the chain represented by Lines 1 illustrates the interconnectedness of the domains within the EFL which is facilitated by the teacher's instructional practices during the lesson. In particular, Teacher X's use of active questioning strategies in guiding students through the annotation process supported their understanding of keywords in the questions and unfamiliar words and new vocabulary in the comprehension passage. Prior to guiding the students through the annotation of the passage, Teacher X reviewed the questions with the class. By deconstructing the questions and clarifying the task requirements, Teacher X emphasised the distinction between extracting a "word" and a "phrase" from the passage, using targeted questions to assess students' understanding of both terms. This step was crucial, as a clear comprehension of the difference between a word and a phrase enhanced the students' ability and confidence to answer the questions accurately and independently after reading the entire passage.

Findings from EFL 1 (Teacher X's lesson)

Table 2: EFL of Teacher X

The questioning technique to check on their understanding of 'word' and 'phrase' can be seen in this excerpt in Table 3:

Table 3: Questioning strategies

Student A	(reads question on worksheet) Which word in paragraph 2 suggests that the hikers managed to get brief sightings of some animals in the jungle?
Teacher X	Yes, ok, now first of all, you have to know that they are asking for a single word. So just go to one word and this is a right there question. Right. What does it mean? You go straight to the passage, find that word in paragraph 2, copy it, you get your marks. B, ok question 2 is similar, which word, so it's a right there also, they ask for one word. How about question 3 B, can you read question 3 for us?
Student B	Which 4 word phrase in paragraph 4 tells us that the headlamps were visible from afar?
Teacher X	Yes, ok so 4 word phrase, means how many words must you give?
Student B	4 words
Teacher X	4 words ah, can the 4 words be anywhere in paragraph 4? Or must it be side by side?
Student B	Hmm, side by side
Teacher X	Why do you say so?
Student B	Because (of) the word 'phrase'?
Teacher X	Yes, phrase tells you it must be side by side. Ok, choose 4 words that, kind of like it forms a phrase, put it in. ok? And same for question number 4, 4 word phrase.

The students' understanding of a word versus a phrase aided them in answering the questions independently towards the end of the lesson. When Teacher X went through the answers with them, they were able to respond accurately and confidently for questions that required them to extract phrases from the passage. This is demonstrated in the excerpt below:

Table 4. Independent application

Teacher X	Question 3, can you read the question and the answer? Question 3.
Student B	Answer question 3?
Teacher X	Mmm.
Student B	Uhmm 'twinkled in the distance'
Teacher X	Yes, is it 4 words 'twinkled in the distance' right? 4 words. Yes correct. Okay, here. And lastly, A, what's your answer for question 4?
Student A	Uhhh 'whooped with sheer delight'

Teacher X's use of questioning strategies in guiding students towards active and accurate meaning making is also evident in the text annotation process. Student A initially inferred incorrectly that the hikers in the story were tired because they stopped multiple times during the hike. Rather than dismissing the student's response, Teacher X drew attention to other contextual clues in the paragraph, emphasising that the hikers paused to admire the beauty of the forest at various points, implying that they felt relaxed and happy rather than tired. This is evident as shown in Table 5.

Table 5. Teacher X's questioning strategy

Teacher X	And after an hour he heard rustling. Yeah. Okay so this is describing his journey up, correct? How do you think he was feeling at this point? Ahh.. Every few minutes, you know?
Student A	Uhmm...tired?
Teacher X	Tired ah? Okay. why do you say tired?
Student A	Uhmm...uhh because, like, they stop and then they start. They stop then they start.
Teacher X	Oh he might be feeling tired. Okay... okay, but you know, let me suggest to you something, A. Every few minutes he stop and admire the trees, then admire the sound of the the the leaves, and admire the monkeys... admire the birds... admire the everything up there, the monkeys and all but his feelings, other than tired what could it be? I think he's in quite a relaxed mood, right? I think he's quite in a relaxed, happy mood, right? If you're not relaxed and you're not happy, you won't stop every.. you won't stop and admire the things. "Get out of the way, get out of the way. Let's go up quickly." Right? He doesn't feel rushed. Can you sense that from him? Right? He says about why the sounds and sights...that is his feeling, also relaxed. Know he's in good... good condition...state of mind, climbing this mountain.

As seen in Table 5, Teacher X's comprehensive and vivid explanation of the writer's emotions in the passage significantly enhanced the students' ability to draw more precise inferences. Additionally, Teacher X encouraged students to adopt the writer's perspective, prompting them to engage in critical thinking by asking, 'If you're not relaxed and you're not happy, you won't stop every...' This approach helped students to reflect on the writer's mindset and deepened their understanding of the text.

Teacher X's strategy of guiding students to adopt the writer's perspective not only enhanced their critical thinking but also fostered a deeper engagement with the text. This teaching approach highlights the intricate connections between cognitive and emotional engagement, which becomes even more evident in the interactions between Teacher X and Student A.

The interaction between Teacher X and Student A is represented by the dotted Lines 2 in the EFL. Initially, Student A was seen struggling to infer the meaning of 'weary' in the comprehension text. While it appeared to be an incorrect application of knowledge due to the confusion with the homophone 'wary', it also clearly suggested a lack of comprehension of contextual clues of the sentence. Instead of informing Student A that his response was incorrect immediately, Teacher X facilitated Student A's understanding by providing the context of hikers that have spent long hours from the early morning, hiking up the mountain. Teacher X then invited Student A by questioning him to rethink the context of the sentence and make another guess to the meaning of weary. This is as seen in an excerpt of their exchange in Table 6 below.

Table 6: Teacher X's facilitation in student A's understanding.

Teacher X	What .. what is weary? What do you think is weary?
Student A	Like... umm... It's like ya... you don't really trust your surroundings? And you become wary of the surroundings.
Teacher X	I see.. I see. ok.. ok.. yea. yea. alright. umm Now think about hikers, A. All of them right start out in the morning. They hike until 3 o'clock. So that's about.. 8 hours of hiking? and they all reach there, how would they be feeling?
Student A	Tired.
Teacher X	Tired. Yes. Ok. So for this word, weary, ok it would mean in this context here, tired. The tired hikers.

Despite guessing the meaning of 'weary' incorrectly the first time, Student A proceeded to make accurate inferences based on Teacher X's explanation on the context of the scenario. Evidently, this demonstrated Student A's resilience in participating which eventually aided Student A in understanding the context and meaning of the unfamiliar word better. This initial scaffolding was important in Student A's independent application to comprehension questions. In addition, Student A attributed this success to Teacher X's annotations in the text. This is illustrated in Table 7 below. These findings show the interconnected nature of the various domains in the EFL. It clearly underscores the importance of teaching practices in fostering student engagement which ultimately aids in their application of knowledge to questions.

Table 7: Teacher X's annotation strategies aided in student A's understanding.

Student A	Yes
Teacher X	Which word?
Student A	Uh 'weary'.
Teacher X	Yes
Student A	You wrote in your annotation.
Teacher X	Yes I did. You see that's... that's the beauty of annotating right... you actually wrote the answer out without knowing.

The teaching practices employed by Teacher Y supported the recommendation of the British Dyslexia Association (2017), where the teacher tailored the practices and approach to meet the specific needs of students with SpLD. Table 8 shows various interactions across and within domains, showing the complex process of teaching. As represented by the chain of arrows labelled Lines 3, the use of online tools plays a pivotal role in creating a positive learning environment that nurtures independence. The use of various online tools to facilitate learning and teaching is supported by Daloiso's (2017) suggestion that a reliance on information technology allows for more targeted response to individual student's needs. Inevitably, online tools also accounted for multisensory instructions that simultaneously facilitate engagement through visual, auditory, kinesthetic and tactile (VAKT) senses. Instructions that are simultaneously multisensory are also part of the OG approach which Teacher Y practices.

Findings from EFL 2 (Teacher Y's class)

Table 8: EFL of Teacher Y

The online tool used, Classkick, served as an interactive platform which allowed students to use different ways to input their answers at their own pace and receive immediate feedback. Alongside YouTube video and the share screen function, students were also provided with visual and audio aids to better understand the context of the passage. By minimising barriers and promoting engagement, these tools helped generate positive attention from both students, keeping them engaged throughout the online lesson. This sustained positive attention directly impacted positive comprehension. Through the online tools which offered multi-sensory learning, they were better able to internalise and process the content of the passage. With an improved comprehension, students felt more confident in their ability to grasp concepts, fostering a sense of autonomy. This was evident when they attempted the questions on their own, relying less on scaffolding. This independence is critical in building long-term academic resilience. The increased independence in comprehension tasks, together with confidence, impacted students' emotions. This emotional expression was observed when a student raised his hands in victory upon obtaining the accurate answer. This progression—from online tools to expressiveness—illustrated how strategically implemented online teaching practices can enhance comprehension and overall academic success for SpLD learners. In conclusion, the researchers found that the use of online tools contributed to positive engagement in increased responsiveness, compliance and attention which supported the final outcome of independent application by the students such as the ability to answer the reading comprehension questions accurately and without guidance.

The next chain of interactions, represented by the chain of arrows labelled Lines 4, stems from classroom management. A significant portion of teaching practices follows principles of the OG approach, which is consistently evident in previous research done by the Prep 2 PSLE programmes (Leong, Asjamiah & Wang, 2017). Under the umbrella of teaching practices, effective classroom management ensures a structured and supportive environment, where learners feel safe and guided. Teacher Y's effective classroom management included engagement through active learning, providing positive reinforcement and motivation, as well as adapting to specific needs of the students throughout the lesson.

In the following example in Table 9, Teacher Y deliberately asked for student E's response as student E had not been participative in answering questions. There was a very long pause and Teacher Y continued with the lesson and interacted with Student D, only to then realise that Student E had already responded by typing in the chat box. Upon realisation, Teacher Y immediately acknowledged and praised student E for the efforts, adding to Student E's motivation and contributed to Student E being more participative at the later stages of the lesson.

Table 9: Acknowledging responses

Teacher Y	Which word in paragraph three tells us that the hikers were physically exhausted when they reached the base camp? Okay, so go back to paragraph three. Which word tells you that the hikers were physically exhausted? E, you want to try this one? D, let's give E a chance. Which word, E? Which word tells you that the hikers were very physically exhausted? One word only. (Long pause)
	(After 2 minutes of interaction between Teacher Y and Student D)
Teacher Y	E, I just saw that you typed in your answer. Sorry I didn't see that you typed in the word 'weary' in the box. Yes, yes E. Okay. I thought you would turn on your mic to answer me. I see your word 'weary' now. Thank you E for participating.

These management techniques are strongly associated with the sustained attention of the students, or their positive responsiveness as indicated in the EFL table.

In addition, Teacher Y used explicit instructions, an emotionally-sound approach and questioning strategies that are cognitive in nature- that is, encouraging students to think and reason through asking high-level questions (Blything, Hardie, & Cain, 2020) and supporting the constant interaction between students' schema and the texts (Ren, 2023). For example, in helping students to picture the setting of the passage (Table 10) and to grasp the vocabulary 'Flora and Fauna' (Table 11), Teacher Y made reference and drew parallels to a video the students had watched just before they read the passage.

Table 10: Picturing the setting

Teacher Y	Okay, so basically that video gives you uh... make you understand what it's like... what is the experience like climbing Mount Kinabalu. Okay? So, you saw her climbing up, you saw a lot of trees around her...umm...the stairs...climbing the stairs and the views and the sights, which is what is described in the passage. Okay, now we read the passage.

Table 11: Expanding on vocabulary

Teacher Y	'Flora and fauna', it refers to the flowers, all right, and the trees and the greenery. Right? You saw that in the video, right? Because hiking is not just about climbing to the top. You should also enjoy the process of moving upwards; the environment and the scenery around you.

However, attention did not always equate to better comprehension. Despite being actively engaged, the student showed cases of inaccurate comprehension. This discrepancy can arise due to various factors, such as difficulties with processing information or the complexity of the texts, despite their active participation. To bridge this gap, Teacher Y utilised targeted questioning techniques as seen in Tables 12 to 14 below. Teacher Y employed both higher order questions to stimulate deeper thinking to help students process information more critically and lower order questions to refine their understanding before extracting key information from the passage. These steered students towards accurate comprehension, contributing to their confidence, driving students to attempt other questions on their own. Eventually, both students showed independence in completing comprehension questions on their own.

Table 12: Lower order- Recall question

Teacher Y	We started at eight in the morning"... Same as the lady in the video, right? She also started her climb at eight o'clock in the morning.

Table 13: Higher order questioning

Teacher Y:	Okay, the climb refers to the climb the next morning when they woke up, okay? "...Wearing a woollen cap with a headlamp attached to it." Why do they need a headlamp, D?
Student D:	To see better in the dark...
Teacher Y:	Yes, because remember, they went... they are going to climb up to the peak in the early hours of the morning, meaning like 5, 6am where it's still pitch dark. So, they need a headlamp. Okay?

Table 14: Higher order questioning

Teacher Y	All right, let's answer question one and two together, then you do three and four on your own. Okay, question one. "Which word... in paragraph two suggests that the hikers managed to get brief sightings of some animals in the jungle?" 'Brief sightings' means they managed to see some animals in the jungle. See very briefly. Okay?
	(Teacher Y draws a pair of eyes below the word 'sightings' for question one)
Teacher Y	'Sightings' means being able to see. Anyone managed to spot the word? It's in paragraph two. So, you need to go back to page two. Which word in paragraph two...
Student D	'Glimpse'?

Overall, this interaction showed how a structured and supportive learning environment can effectively guide students from focused attention to greater autonomy in their learning, ultimately fostering both academic growth and self-confidence. These classroom management approaches and questioning strategies are critical not only in helping students better comprehend the reading passage but also in building their confidence as the lesson progresses. This is as seen in Table 15. This is evident in students' body language and expressions, which suggest they were comfortable responding to teacher Y, with one student even letting out a celebratory expression upon answering a question correctly.

Table 15: Emotional Engagement

Teacher Y	E, do you need help with question four? Or you're okay? Just remember that...
	(E shows a thumbs up to Teacher Y)
Teacher Y	Okay, you're good. Question four... paragraph four, it's quite long, yeah. So, you need to refer to the second part of paragraph four which is on page three.
	(D enters)
Student D	Okay, I'm back.
Teacher Y	Okay. E I have marked your answers. All right, both of you. Well done! Both of you got the answers correct. Wuhu!
	(D and E celebrate on screen)

Another chain of interaction represented by the bolded Lines 5 started with students' distraction or negative attention. During the lesson, student A was observed to be doodling on the online worksheet while student B was seen playing with his soft toy and putting it close to the video camera. Such instances of distraction led to negative compliance as they did not follow Teacher Y's instruction to highlight or type their answers on the worksheet. This lack of compliance prompted Teacher Y to utilise classroom management techniques to redirect students' behaviour. As seen in Tables 16 to 20, throughout the lesson, Teacher Y successfully directed both students to complete the expected tasks and apps, and managed to encourage them to participate and respond to her questions.

Table 16

Teacher Y	Yeah, go back to page two. Okay? So, we are... what do you think the passage is gonna be about, E? E, I can't see your face. Can I see your face, please?
	(E pulls screen to show face)

Table 17

	(D show Teacher Y his stuffed toy)
Teacher Y	Okay, I'm going to read paragraph one. Okay. Please listen carefully because you are going to be answering some questions later. "I am not a mountaineer." Okay, what do you think a mountaineer means?

Table 18

Teacher Y	I double click on it and I... it led me to a website. Ah. Okay so E has also found the meaning of Borneo for us. Borneo has a distinction of the only island in the world that is shared by three countries. Malaysia Indonesia and Brunei. So Borneo is basically umm...(clicks tongue) uh... (clicks tongue) uh what's that... an island that's made up of Malaysia, Indonesia and Brunei. Okay? All right. Let's move back. Thank you for sharing, E. You're very fast. Let's go back to ClassKick. Okay?

Table 19

Teacher Y	Very good, I see D highlighting as I move along. Okay good, E as well. Okay, question two: "State two reasons why Helen was bored." Okay E, what should we highlight in this question? E, turn on your mic and answer. You can respond and then we can try...
Student E	'Two reasons'.
Teacher Y	'Two reasons', okay good. Highlight 'two reasons'. 'Why'...okay, you also need to highlight 'why' because 'why' is an instruction word.

Table 20

Teacher Y	Very good, I see D highlighting a few things. Okay. They ask you "how do we know"... Okay so, highlight 'how' because 'how' is a instruction word. 'How'... 'How' means the manner, right? Uhmmm...
	(E highlights 'enjoyable and easy')
Teacher Y	"we know that Helen's walk to the beach was enjoyable and easy"...Very good! E highlighted 'enjoyable and easy'.

With this, both students displayed positive compliance and they were able to follow instructions and engaged with tasks given to them. This shift is not merely about obedience but about genuine participation, where students are motivated to engage because they feel supported and connected to the learning material. As they experienced success through positive compliance, they gained confidence in their ability to complete tasks independently. This led to greater independence where learners take ownership of their learning process, requiring less external guidance and showing a more proactive approach to tasks. Overall, through this progression, classroom management acted as the bridge between initial disengagement and eventual self-directed learning.

In addition to analysing the two teachers' lessons through EFL tables and specific interactions, the researchers explored the interconnectivity across domains. Beyond this, common themes were identified from the recorded videos and are discussed below. Despite differences in instructional styles, both Teacher X and Teacher Y adhered to the Orton-Gillingham (OG) approach and the RIMAIR structure prescribed by the Prep 2 PSLE programme. This aligns with findings by Leong et al. (2017) on the consistent use of the OG and RIMAIR structure.

Simultaneously multisensory

Firstly, both teachers used a variety of multisensory resources to activate their various learning pathways. Classkick was used not only as an online worksheet for individual students to work on, it was also used as a tool to incorporate short quizzes such as Multiple-choice Questions and Short-Answer Questions to test on students' understanding of what they have read in the text. Moreover, Classkick allowed for the embedding of links which made it convenient for the teachers to search and present to students important background knowledge. This aspect was important in aiding students' understanding of the text and ultimately their application of learnt skills and strategies to the questions. This was observed in Teacher X's class where A made an accurate application and attributed it to Teacher X's annotations on the text.

Moreover, the use of YouTube videos further enhanced the visual and auditory experience for students. Undoubtedly, this enhanced the students understanding of the text as evidenced by Teacher X's lesson where student A had made references from what he had watched in the video to the information in the comprehension text. He questioned why the hiker in the text was welcomed with a buffet spread as opposed to the YouTube video who had a simpler meal. Evidently, this multisensory approach helped students to make meaningful connections between text and real-life scenarios, further enhancing their knowledge and understanding.

Notably, the curriculum developers from Prep 2 PSLE had pre-planned these resources and materials for online classes and they were made readily available for all teachers.

Through this illustration, it is clear that there are interactions at play beyond the domains of student engagement; spanning across other domains of teaching practices and students' application.

The study on the effectiveness of Orton-Gillingham-based instruction with Singaporean children with dyslexia highlighted the importance of a multisensory approach in learning. The Orton-Gillingham programme, which incorporates visual, auditory, tactile, and kinesthetic senses, showed positive results in improving word recognition and word expression skills in children with dyslexia. The use of simultaneous multisensory instruction in teaching language components was found to be intensive, direct, and explicit, leading to significant improvements in reading abilities. This underscores the effectiveness of multisensory techniques in enhancing learning outcomes for individuals with dyslexia. (Hwee & Houghton, 2011)

Emotionally-sound approach

Both teachers also practised an emotionally-sound approach in the online classrooms. This was evident in various instances during the observations. Teacher X always acknowledged all students' responses even though they were inaccurate at times. The students were then guided with question prompts to help them derive an accurate answer. This encouraged emotional engagement in students. Fostering a positive learning environment allows students to be more proactive in participating without hesitating to share their answers and opinions. This is evident in Teacher X's class where A and B continued to make predictions and responded to Teacher X's prompts throughout the lesson.

Similarly, as seen in Table 21 and 22 below, Teacher Y reinforced a positive learning environment by giving constant encouragement through praises that were specific to the child's progress and abilities as well as availing herself for support.

Table 21. Providing assurance

Teacher Y	Let me know if you need help?

Table 22. Verbalising appreciation

Teacher Y	I saw you typed the answer. Thank you for typing in and participating.

Both Teachers X and Y also consistently checked in with the students. They kept asking their students if they had any difficulties and whether they needed any help. Both teachers also ensured to check-in with their students on their audio and visual to ensure

that their students are able to follow through the lesson without compromises in technical difficulties. It is evident that both Teacher X and Y fosters a positive learning environment; providing a safe space for their students to make errors and learn and giving encouraging and constructive feedback. Given the stigma and misconceptions that surround the learning abilities of students with SpLD, an inclusive and supportive learning environment is crucial in developing their motivation and self-esteem (Khalid & Anjum, 2019).

Cognitively engaging

Through text and question analysis, both Teachers X and Y consistently stimulated their students' cognitive abilities to engage deeper with the reading material. A range of lower and higher level questioning strategies were evident in both teachers' interactions with students.

According to Table 23, it is evident that both teachers employed the use of recall to activate students' prior understanding and retention of topics they have learnt.

Table 23 : Number of higher and lower level questions in both classes.

	Questioning Strategies	
	Higher level	**Lower level**
Teacher X	22	16
Teacher Y	16	25

As seen in Table 24 and 25, it is evident from these extracted conversations across both classrooms that both teachers prompted students with questions to review what they have previously learnt. Students with specific learning disabilities (SpLD) often struggle with working memory, which plays a crucial role in retaining and processing information

Table. 24

Teacher X	What do you remember about the lesson last week?

Table. 25

Teacher Y	What are the two types of questions we've learnt?

(Alloway et al., 2005). As such, having a review of prior week's work done in the previous lesson is crucial to help them retain the knowledge that they have learnt.

Another type of lower level questions, the instructional questions, were also posed during the lessons. This is as seen in Table 26 below.

Table. 26

Teacher Y	Can you give me a thumbs up when you are ready?

As explained by Nguyen & Nguyen, (2023), these questions allowed the teachers to assess the understanding of the students, encouraged participation, as well as aided in their confidence boost. Consequently, students in both classes were observed to be asking questions to seek clarifications, thereby showing evidence of cognitive engagement.

Both teachers also showcased the use of higher level questioning strategies which prompts students to analyse and synthesize the comprehension text. These questions include the use of vocabulary-context, making predictions and evaluative skills.

Table. 27

Teacher X	What is a mountaineer?

Table. 28

Teacher Y	What is the meaning of sheer?

These vocabulary-context questions were not just to assess their prior knowledge and exposure, but were also integral for them to grasp the content of the text.

Table. 29

Teacher X	What do you think is flora and fauna?

The question posed by Teacher X in Table 29 is an example of a vocabulary based question assessing the student's prior knowledge, as well as the use of contextual clues to make informed guesses. Higher level questions relating to making predictions were also captured in both lessons.

Table. 30

Teacher X	Why are there headlamps on other hikers? Why is it twinkling in the distance?

In this case, students were guided to form logical reasoning and to make predictions.

Table. 31

Teacher Y	What do you think the passage is going to be about?

On the same note, Teacher Y posed the above question to the class after looking through all the listed questions from the text. This backward strategy encouraged students to use the contextual clues from the questions to form a prediction regarding the content of the passage.

Table. 32

Teacher Y	Do you think 'Right There' questions are easy?

The question posed in Table 32 requires the students to recall the concept of Right There questions and evaluate on its difficulty level.

Evidently, these questioning strategies, both lower and higher level questions, require students to think critically by analysing the text, inferring meaning from the contextual clues and extracting and synthesising accurate and appropriate responses. These skills play a crucial role in aiding students to have a deeper engagement and understanding with the reading material and at the same time, enable better retention of information (Thamrin et al., 2019).

Direct and explicit instruction

Teacher X and Y also employed the strategy of text annotation in delivering the comprehension lesson. Annotation is a useful method to enhance the meaning-making process for all students, especially those with reading difficulties, by making explicit connections to different parts of the text. The teachers' use of annotation for a significant part of the online comprehension lesson contributed to clarity and comprehension and kept the students cognitively engaged as they comprehend the highly descriptive passage on Mount Kinabalu, which contained numerous unfamiliar vocabulary words. Beyond the comprehension passage, Teacher Y also instructed Student D and E to

annotate the comprehension questions to assist them in effectively extracting accurate relevant information from the text. In Teacher X's lesson, Student A was observed to have made references to the text annotations made by Teacher X to help him derive the answers for his written responses.

Adeptness with online tools

A noteworthy finding from the data of both online classrooms has revealed differences in teachers' utilisation of resources. All resources used were similar across both classrooms. Links embedded in the text provided accessibility and efficiency in sourcing for the geographical location of Mount Kinabalu. Moreover, multiple-choice questions were also strategically placed in the text to test students' understanding of vocabulary terms such as 'prominently'. Notably, the differences in both teachers' teaching styles resulted in different ways in which the pre-planned resources were utilized. While Teacher Y displayed a separate worksheet on her presentation screen, Teacher X presented the worksheet in edit mode. As such, he was not able to use the functions accurately to maximise the engagement of the material. Moreover, the confusion with the fill-in-the-blank function also resulted in a wrong interpretation of the vocabulary term 'prominently' which carries all three meanings as per Table 33.

Table. 33

Teacher X	Oh ok. Yeah now think about it. You're at somewhere high up, one third of the journey. You're pretty high up already with the fog, right? You know and in the background ah, the peak of this Mount Kinabalu that you want to conquer its so high *inaudible* And it's very prominent. So not just proudly any words *inaudible* Boxu?
Student B	Hmm? I can't hear.
Teacher X	What...what's uhh...what other words do you have in mind for prominently?
Student B	Confident?
Teacher X	Confidently. Okay, so let's take a look at the questions that we have. Okay, so prominently...here. Do you think it would be...which would be a better answer? Noticeable, striking...strikingly or stands out? Prominently. So...

This finding suggests the importance of teachers' adeptness to the learning tools that are readily available to them. Utilising these resources correctly would ensure enhanced engagement and understanding for students.

An interesting observation from both online classroom lessons were the brief moments where students were observed to be distracted. This distraction stems from the home learning environment that they were in. Online learning allows for the seamless tuning in and out of lessons by switching off the audio and video functions. As observed in Teacher X's classroom, C switched off her video and this makes it impossible to access her engagement and participation level in that session. Similarly, in Teacher Y's classroom, there were several instances in which D appeared to be talking to someone while the class was ongoing. As D's audio was muted, this was only justified through the observations of gestures. D pointed to the left and appeared to be talking without unmuting his audio. This makes it challenging for researchers to accurately assess and conclude on his engagement at that moment.

Impact of students' needs and abilities on learning outcomes

The analysis of Teacher X and Y's lessons in this study have shown that the engagement and learning output of students in online learning are influenced by their individual needs and capabilities. Learning needs according to this paper's findings refers to the difficulties and challenges faced by SpLD students during online learning and their observed social and emotional needs during the course of the lessons. Learning output could refer to the tangible or observable results of the learning process, such as projects, assignments, or assessments that students produce. It might also be used to describe the overall performance or achievement of learners at the end of a learning experience.

Teacher Y actively used explicit and repeated instructions in her lesson delivery to ensure the students are on task, to direct students to specific parts of the comprehension passage and to emphasise the keywords that they should be highlighting in questions. This teaching practice of incorporating repetitions proved to be effective in enhancing students' concentration and maintaining on-task behaviour, ensuring they remain engaged and connected even in the absence of the teacher's physical presence. While there were instances of Student D and E fidgeting, Student D misidentifying keywords, and seeking clarification from Teacher Y, on overall both the students were observed to comply with verbal instructions. This compliance significantly contributed to their ability to generate accurate verbal and written responses as seen in the EFL.

Another aspect of learning need for SpLD students observed in this study is the importance of supporting their emotional needs as it impacts their engagement and learning output in online learning. This is in line with the OG principle of being emotionally sound in lesson delivery as discussed in the earlier part of this discussion. Students with SpLD usually have lower self-esteem and learned helplessness (Woodcock

& Hitches, 2017) In the online classroom setting, where the ability to actively observe students' body language and facial expressions is constrained to the camera frame, it is imperative for teachers to prioritise addressing students' emotional learning needs by focusing on their verbal expressions.

Table. 34

Teacher Y	E, you looked a bit lost, are you ok?

This proactive approach is essential to foster engagement and active participation in the lesson so that weaker learners will be motivated to unmute their virtual microphones and respond to the teacher. As seen in the EFL of Teacher X and Y's lesson, the emotionally sound approach aided students' willingness to participate in the class by sharing their thoughts and answers and motivated the students to respond to questions asked by the teacher even though there might be inaccuracies in their responses. This shows that recognising students' emotional needs and verbally acknowledging their efforts becomes paramount in an online learning environment. This approach is essential to maintaining both cognitive and emotional engagement, ensuring sustained motivation for learning, and, most importantly, enabling students to gain as much knowledge as possible. In both physical and online classrooms, creating an environment that fosters a sense of mastery, encourages effort, and provides opportunities for success are crucial to prevent the development of learned helplessness in learners.

It is crucial to recognise that online learning may not be suitable for every student and a comprehensive understanding of learner attributes is necessary to support curriculum developers in creating high-quality online courses tailored to meet students' needs. Additionally, not all students possess the necessary attributes for online learning, particularly those with SpLD, given the variations in learning and cognitive styles.

Overall, the findings of this study have shown that teaching practices play a pivotal role in fostering engagement across various domains, including behavioural, cognitive, and emotional aspects, as evidenced by the interactions within the engagement framework for learning (EFL) for Teacher X and Y's lessons (Fredricks, 2004). The intricate dynamics observed within each EFL highlight how these teaching approaches intricately influence and facilitate student involvement in the lesson. In other words, teachers' methods not only shape students' observable actions and participation (behavioural engagement) but also impact their cognitive processes, such as critical thinking and problem-solving (cognitive engagement), as well as their emotional connection and investment in the learning experience (emotional engagement). This interplay of factors across the components of the EFL underscores the significance of intentional instructional strategies in promoting a comprehensive and enriching engagement experience for students.

IMPLICATIONS

This present study has important implications for educators and researchers in the field of online teaching. The Engagement for Learning (EFL) framework serves as an important tool for educators to use so as to reflect upon their teaching practices and their outcome on student engagement and application.

By using the EFL to critically reflect upon their teaching methods, teachers can then make improvements in their lesson delivery and ultimately optimise students' learning outcomes. Additionally, the findings from this study highlighted the importance of equipping teachers with the necessary knowledge and skills to successfully plan, navigate and execute a lesson on digital platforms. As online lessons are increasingly becoming a commonplace in today's context and digital tools continue to evolve with time, professional development is crucial to ensure that educators remain relevant to meet the needs of theirs students while also ensuring an engaging learning experience. This further reiterates the importance of institutions investing in professional development of educators.

LIMITATIONS

There are potential limitations in this study that may impact the generalizability of the results. Firstly, this study relies on a small sample size of two classes being observed for an hour each, with each lesson focusing on only open-ended Reading Comprehension. This limits the ability for the researchers to generalise findings to a larger population and other lesson components (Synthesis & Transformation, Grammar, Editing) of the Prep 2 PSLE programme.

The present study relies heavily on the researchers' interpretation of student engagement based on lesson observations. The absence of self-report data collection, such as questionnaires to capture participants' emotional engagement and perspectives of the lesson, may hinder the researchers from having a comprehensive understanding of student engagement. Furthermore, other aspects of engagement could be present but not observable within the camera frame and have gone unnoticed by the researchers. Students may also not have overtly expressed their emotions and behaviours due to the nature of online learning. The physical learning environment where students were situated during the online lessons were also not considered, an aspect that might influence student engagement and learning outcomes.

Finally, the presence of research bias, particularly concerning differences amongst the researchers in categorising their observations across various domains of the EFL framework, raises concerns about the objectivity and reliability of the study's interpretations. These limitations underscore the need for caution when interpreting the findings and highlight avenues for future research to address these gaps.

RECOMMENDATIONS FOR FUTURE RESEARCH

While the present study offers valuable insights, future research with a larger sample size and a more extensive collection of students' independent applications of skills could yield more generalizable and conclusive findings. Incorporating self-reported data from students could further enhance our understanding by providing a student-centric perspective on their engagement during online lessons. Specifically, the inclusion of questionnaires to assess students' emotional engagement, which may be less accessible through direct observation, could offer richer data. Furthermore, integrating educators' self-reported data, such as reflective questionnaires or interviews, would not only enhance the validity of the findings but also allow for diverse interpretations, particularly regarding educators' perceptions of online tools in the classroom. As the current study focused on students with Specific Language Impairment (SLI) and Dyslexia, future research should explore potential correlations between various Specific Learning Differences (SpLDs) and student engagement in online educational settings. To broaden the scope of this study, future researchers could examine the factors that influence student engagement, the effective application of skills in Prep 2 PSLE in-class lessons, and the challenges associated with transferring these skills to students' broader academic work beyond the Prep 2 PSLE context.

CONCLUSION

The data from this research points to the effective use of online tools to enhance cognitive engagement and critical thinking in learners. It also illustrates the diverse ways educational therapists utilise the same tool in their instructional methods. Findings from this study will also inform the Prep 2 PSLE programme of effective online teaching practices and multimedia classroom resources so that these can be integrated into training for all its teachers to equip them with necessary skills to conduct virtual lessons.

REFERENCES

Al-Zahrani, M. Y., & Al-Bargi, A. (2017). The Impact of Teacher Questioning on Creating Interaction in EFL: A Discourse Analysis. *English Language Teaching, 10*(6), 135-150.

Anderson, R. C. (1977). The notion of schemata and the educational enterprise. *Reliable Computing, 22*(1),165-176.

Alloway, T. (2006). How does working memory work in the classroom? *Educational Research and Reviews, 1*(4), 134-139.

Archambault, I., Janosz, M., Morizot, J. & Pagani, L. (2009). Adolescent Behavioral, Affective, and Cognitive Engagement in School: Relationship to Dropout. *Journal of School Health. 79*. 408 - 415. http://doi.org/10.1111/j.1746-1561.2009.00428.x

Berenson, R., Boyles, G., & Weaver, A. (2008). Emotional Intelligence as a Predictor of Success in

Online Learning. *The International Review of Research in Open and Distributed Learning, 9* (2). https://doi.org/10.19173/irrodl.v9i2.385

Blything, L. P., Hardie, A., & Cain, K. (2020). Question asking during reading comprehension instruction: A corpus study of how question type influences the linguistic complexity of primary school students' responses. *Reading Research Quarterly, 55*(3), 443-472.

British Dyslexia Association. (2017). *Understanding neurodiversity. A guide to specific learning differences.* https://cdn.bdadyslexia.org.uk/uploads/documents/Dyslexia/ A_Guide_to_SpLD_2nd_ed.pdf?v=1554931179

Cárdenas, Y. I. C. (2021). Questioning as an Effective Tool to Enhance Students Interaction in the English Classroom. *South Florida Journal of Development, 2*(2), 3510-3520. http:// doi.org/10.46932/sfjdv2n2-185

Chia, N., & Houghton, S. (2011). The effectiveness of Orton-Gillingham-based instruction with Singaporean children with specific reading disability (dyslexia). *British Journal of Special Education, 38,* 143 - 149. http://doi.org/10.1111/j.1467-8578.2011.00510.x

Chiu, T. K. F. (2021). Applying the self-determination theory (SDT) to explain student engagement in online learning during the COVID-19 pandemic. Journal *of Research on Technology in Education, 54*(S1), S14-S30. https://doi.org/10.1080/15391523.2021.1891998

Cimermanova, I. (2015). Teaching English as a foreign language to dyslexic learners. In S., Pokrivčáková, et al. (Ed.), *Teaching Foreign Languages to Learners with Special Educational Needs: e-textbook for foreign language teachers.* (pp. 39-62). Nitra: Constantine the Philosopher University.

Daloiso, M. (Ed.). (2017). *Supporting Learners with Dyslexia in the ELT Classroom.* Oxford University Press.

Davoudi, M., & Sadeghi, N. A. (2015). A Systematic Review of Research on Questioning as a High-Level Cognitive Strategy. *English Language Teaching, 8*(10), 76-90.

Dyslexia Association of Singapore. (2023). *Dyslexia and other SpLDs.* https://das.org.sg/what-are-splds/

Eom, S., Wen, J. & Ashill N. J. (2006). The Determinants of Students' Perceived Learning Outcomes and Satisfaction in University Online Education: An Empirical Investigation. *Decision Sciences Journal of Innovative Education, 4*(2), 215-235.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*, 59-109.

Gettinger, M., & Walter, M. J. (2012). Classroom strategies to enhance academic engaged time. In S. L. Christenson, A. L. Reschly, & C. Wylie, (Eds.), *Handbook of research on student engagement* (pp. 653-673). Springer Science + Business Media.

Gustiani, S. (2020). Students' motivation in online learning during COVID-19 Pandemic Era: A CASE STUDY. *Holistic Journal, 12*(2), 1-18.

Harvey, S., & Goudvis, A. (2000). *Strategies that work: Teaching comprehension to enhance understanding.* Portland, ME: Stenhouse.

Kerr, M., Rynearson, K. & Kerr, M. (2006). Student Characteristics for Online Learning Success. *Internet and Higher Education, 9*(2), 91-105.

Khalid, M., & Anjum, G. (2019). Use of remedial teaching approaches for dyslexic students: Experiences of remedial teachers working in urban Pakistan. *Cogent Psychology, 6.* http:// doi/org/10.1080/23311908.2019.1580181

Knopf, T., Stumpp, S. & Michelis, D. (2021, July). How Online Collaborative Learning leads to improved Online Learning Experience in Higher Education. *ECSM 2021 8th European Conference on Social Media, Larnaca, Cyprus.* http://doi.org/10.34190/ESM.21.010

Kuh, G. D. (2003). What We're Learning About Student Engagement From NSSE: Benchmarks for Effective Educational Practices. *Change: The Magazine of Higher Learning, 35*(2), 24–32.

Lama, A. V. (2019). Difficulties In English Language Learning for Students with Dyslexia. *South East European University. Review, 14*(1), 196-206.

Lawson, M. A., & Lawson, A. A. (2013). New conceptual frameworks for student engagement research, policy, and practice. *Review of Educational Research, 83*(3), 432-479.

Lazareva, A. (2018). Factors Affecting Student Engagement in Online Collaborative Learning Courses. In M., Auer, D., Guralnick, & I. Simonics, (Eds.), *Teaching and Learning in a Digital World* (pp. 349-359). ICL 2017. https://doi.org/10.1007/978-3-319-73204-6_39

Lei, H., Cui, Y. & Zhou, W. (2018). Relationships between student engagement and academic achievement: A meta-analysis. *Social Behavior and Personality: an international journal, 46*, 517-528. http://doi.org/10.2224/sbp.7054

Lennox, J., Reuge, N., & Benavides, F. (2021). UNICEF's lessons learned from the education response to the COVID-19 crisis and reflections on the implications for education policy. *International Journal of Educational Development, 85*, 102429. https://doi.org/10.1016/j.ijedudev.2021.102429.

Leong, E. (2015). Improving English exam skills for dyslexics in primary education in Singapore. *Asia Pacific Journal of Developmental Differences, 2*(2), 184-201. http://doi.org/10.3850/S2345734115000289

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. http://doi.org/10.3850/S2345734117000107

Matra, S. D. (2014). Teacher questioning in classroom interaction. *Celt: A Journal of Culture, English Language Teaching & Literature, 14*(1), 82.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of Evidence-Based Practices in Online Learning: A Meta-analysis and Review of Online Learning Studies. US Department of Education.* https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Moreira, P., Dias, A., Matias, C., Castro, J., Gaspar, T., & Oliveira, J. (2018). School effects on students' engagement with school: Academic performance moderates the effect of school support for learning on students' engagement. Learning and Individual Differences, 67, (67-77). https://doi.org/10.1016/j.lindif.2018.07.007

Morton, J., & Frith, U. (1995). Causal modeling: A structural approach to developmental psychopathology. In *Developmental psychopathology, Vol. 1: Theory and methods* (pp. 357-390). John Wiley & Sons.

Muilenburg, L. Y. & Berge, Z. L. (2005). Student Barriers to Online Learning: A Factor Analytic Study. *Distance Education, 26*, 29-48.

Nguyen, T. D., & Nguyen, H. B. (2023). The Effects of Questioning as Pre-reading Activity on EFL Grade 12 Students' Critical Thinking in Reading Classes in Kien Giang, Vietnam. *European Journal of English Language Teaching, 8*(4). http://doi.org/10.46827/ejel.v8i4.4999

Pérez-Salas, C. P., Parra, V., Sáez-Delgado, F., & Olivares, H. (2021). Influence of Teacher-Student Relationships and Special Educational Needs on Student Engagement and Disengagement: A Correlational study. *Frontiers in Psychology, 12*, 1-12. http://doi.org/10.3389/fpsyg.2021.708157

Phan, N. P. T., & Nguyen, H. B. (2021). Teachers' Perceptions of Questioning as Pre-teaching Stage in General English Classes. *European Journal of English Language Teaching, 6*(5).

Raslie, H., Mikeng, D., & Ting, S. H. (2015). Reciprocal teaching and comprehension of struggling readers. *International Journal of Education, 7*(1), 131-142.

Razak, T. E. A., See, E., Tan, J. & 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.

Razak, T. E. A., Asjamiah, S., Wang, A. & Leong, E. (2021) Progress monitoring of dyslexic primary school learners enrolled in an English Exam Skills Programme. *Asia Pacific Journal of Developmental Differences, 8*(1), 5-29.

Ren, S. (2023). The Application of Schema Theory to the Teaching of Reading Comprehension. *Journal of Education and Educational Research, 2*(3), 86-88.

Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., & Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *Journal of educational psychology, 104*(3), 700-712.

Ruey S. (2010) A case study of constructivist instructional strategies for adult online learning. *British Journal of Educational Technology, 41*(5), 706 - 720.

Rupley, W. H., Blair, T. R., & Nichols, W. D. (2009). Effective reading instruction for struggling readers: The role of direct/explicit teaching. *Reading & Writing Quarterly, 25*(2), 125-138.

Sujariati, S., Rahman, A. Q., & Mahmud, M. (2016). English Teacher's Questioning Strategies in EFL Classroom at SMAN 1 Bontomarannu. *ELT Worldwide, 3*(1), 107-121.

Szabó, L., Zsolnai, A. & Fehérvári, A. (2024). The relationship between student engagement and dropout risk in early adolescence. *International Journal of Educational Research Open, 6.* http://doi.org/10.1016/j.ijedro.2024.100328

Tofade, T., Elsner, J., & Haines, S. T. (2013). Best practice strategies for effective use of questions as a teaching tool. *American journal of pharmaceutical education, 77*(7), 155. https://doi.org/10.5688/ajpe777155

Tross, S. A., Harper, J. P., Osher, L. W., & Kneidinger, L. M. (2000). Not just the usual cast of characteristics: Using personality to predict college performance and retention. *Journal of college student development, 41*(3), 323-334.

Wangru, C. (2016). The Research on Strategies of College English Teachers Classroom Questioning. *International Education Studies, 9*(8), 144-158.

Wasserman, E. (2020, June 9). New Harvard study shows benefits of active learning versus lecture - Center for Teaching and Learning. *Center for Teaching and Learning.* https://ctl.wustl.edu/new-harvard-study-shows-benefits-of-active-learning-versus-lecture/

Wibowo, Y. E. W., Syafrizal, S., & Syafryadin, S. (2020). An Analysis of English Teachers' Strategies in Teaching Reading Comprehension. *Journal of Applied Linguistics and Literacy, 4*(1), 20-27.

Woodcock, S., & Hitches, E. (2017). Potential or problem? An investigation of secondary school teachers' attributions of the educational outcomes of students with specific learning difficulties. *Annals of dyslexia, 67*(2), 299-317.

Integration of Assistive Technology in the Teaching of Incarcerated Students with Learning Challenges: One Instructor's Perspectives

Christina White Prosser[1]* and Roswita Dressler[1]

1.   *Werklund School of Education, University of Calgary, Canada*

Abstract

While 7-10% of the people in the world are estimated to have dyslexia (Dyslexia International, 2022), the percentage of incarcerated persons with these "specific reading difficulties" is estimated at 40% (Dewey et al., 2020). Additionally, due to schooling experiences and a negative stigma associated with diagnosis, most of the older individuals remain undiagnosed (International Dyslexia Association, 2020). For instructors in correctional education, this means that they may suspect dyslexia, but do not have official diagnoses to support their instruction. They often teach with these diagnoses in mind, but face additional challenges because correctional education is typically a pen and paper setting. Safety protocols and lack of funding for technology mean that resources that might be present in other adult learning contexts (e.g., smartphones, laptops, electronic dictionaries) are not available to students. Teaching under those constraints makes it difficult to effect the very change correctional education intends: to provide adult learners with skills, knowledge and attitudes that will help them to make different choices upon release and will result in their living as productive members of society.

Keywords: Assistive technology, learning challenges, corrections, correctional instructors, instructional design

* Correspondence to:
Christina White Prosser: https://orcid.org/0000-0001-9140-1114 and Roswita Dressler: https://orcid.org/0000-0003-1579-6446
We have no conflicts of interests to disclose Email: christina.white1@ucalgary.ca

INTRODUCTION

Until recently, correctional instructors have had few options for assistive technology - technological tools that facilitate learning in educational settings. With technological and safety advancements, coupled by jurisdictional approvals, a new tool is being approved for use in correctional settings: a scanning pen. A scanning pen is a device that looks like a thick pen or highlighter, but contains a mini-computer and a small screen. There are several brands on the market, but for our research, we refer specifically to the ReaderPen Secure (hereafter "the Pen"). When the student glides the Pen over a type-written sentence, it reads back the words to the student, thereby providing them with immediate feedback as to what the text says and how to pronounce the word. If they encounter a word they do not know, they can use the dictionary function to find out the meaning. The Pen can be used with or without headphones. Since it does not have a recording function and meets other safety requirements, it has been approved for use in several Canadian correctional institutions.

To ensure optimal use, instructors benefit from training in the use of the Pen and guidance in how to integrate it into their courses. In our larger research project, we have worked with correctional instructors to investigate their perceptions of the benefits and challenges to this integration. Regarding dyslexia, we wanted to know how they used the Pen with individuals with dyslexia (either confirmed or suspected) to determine if this assistive technology was particularly helpful. For the purpose of this article, we examine one experienced instructor's perceptions both before and after integrating the Pen.

LITERATURE REVIEW

Exploring the context of the use of assistive technology in learning environments and more specifically, with students with learning challenges like Dyslexia and Attention Deficit Disorder, is key to understanding the successes and gaps in its use. Assistive technology has been integrated into learning environments for decades in different forms (Fernández-Batanero et al., 2022) to assist with different physical and cognitive challenges that students face while learning. There is a possible benefit to using technology as it may provide autonomy of learning for the student (Cloete, 2017). Working inside the corrections environment brings even more complexity to students' learning as these severely structured environments bring constraining logistics around programming, daily schedules, and institutional policies (Mastrorilli, 2016). Literature, or lack of literature, on assistive technology-enhanced adult learning both in typical and correctional environments, provides a picture of the current state of use and impact.

Adult students who struggle with literacy learning have been a recent and growing concern. Factors influencing this struggle include an increase in diagnosis of children in recent years who are now entering adulthood and yet, ironically, adults who were not tested to identify and diagnose learning or cognitive disabilities and challenges (Dewey

et al., 2020; Learning Disabilities Association of Canada, 2024;). The awareness of assessment and teaching strategies for learning disabilities related to literacy has been around for over 60 years (Kirk & Bateman, 1962). Typically, undiagnosed students would be described as having difficulty reading and writing, which was inaccurately attributed to a lack of focus and hard work (McBride, 2019). Adult learning students in corrections often struggled throughout their formal schooling journey, not achieving academic success and typically their journey was accompanied by a lack of self-esteem, self-confidence and self-competence (Curwen & Sharpe, 2012). These past difficulties restrict the students' success in post-secondary courses, often leading to difficulty in acquiring and maintaining employment and securing long-term career pathways (Zhang, 2006). Additionally, age-appropriate methodologies to address adults with dyslexia is still considered a gap in the learning approaches for adults with dyslexia. According to McLoughlin and Leather (2013) "most interventions from assessment through to tutoring and accommodation are directed to the adult population who are still in education, and methodologies [are] based on models developed for work with children" (p. 2). Creating even more complexity is the broader indirect and direct discrimination students with learning disabilities encounter while in correctional environments. According to Gormley (2022), "institutional failings, or disabling barriers, revealed the hidden harms that people with learning disabilities face in prison", examples include lack of understanding prison sentences and release, lack of access to services, and high levels of fear of, harassment by and victimization (p. 266). The consequences of struggles with literacy learning are far reaching.

Reviewing the situation of adults with learning disabilities detained in correctional facilities reveals that the number of adults with learning disabilities is exponentially higher than in the nonincarcerated population. The percentage of students with learning challenges in correctional environments is 40% (Dewey et al., 2020). This number can be even higher when you add in individuals who are basic literacy learners and additional language learners (DelliCarpini, 2006). These students require additional support in the classroom, so the instructors are tasked with preparing for and teaching a group of students with diverse learning needs.

Before implementing technology, instructors invest time in learning the technology themselves, identifying which students might benefit from using assistive technology and developing instructional design strategies that align with the students' needs and the outcome of the courses (King, 2017). Teaching in correctional environments is complex as this closed environment is tightly managed by routines and processes that prioritize safety and institutional priorities. This impacts the teaching and learning through lockdowns, court procedures, disciplinary actions and individual transfer out of the institution mid-course. Instructors mitigate these realities using flexible teaching strategies and time management plans for students (McAleese, & Kilty, 2020). For example, they may send students back to their living spaces with work so they can complete a course. Increased student mental and cognitive needs also impact the class environment,

requiring specific strategies to meet student needs. Teachers typically utilize adult learning principles to ensure teaching strategies are relevant, meaningful, progressive, and cooperative to cater to the student's life experiences and personal and professional learning goals (Lugo, 2018; Merriam & Baumgartner, 2020). In addition, inclusive teaching practices and teaching tools are implemented as needed as the students attending class may be learning basic literacy or English language and/or have learning challenges. Learning challenges may include dyslexia, Attention Deficit Disorder, and other general or undiagnosed learning challenges (Bhatti, 2010). Franklin (2018) reported that while integrating the pen into the classroom, "tutors carefully consider the needs of their students and ensure confidence building is a focus within lessons" (p. 7). Developing inclusive strategies using assistive technology can provide possible solutions to decoding words, reading comprehension, defining terms, and pronunciation (MacArthur et al., 2001). While technology provides learners in corrections several options to enhance learning (Tilt, 2024), little is known about how assistive technology for learning in correctional environments is used. Since handheld assistive technologies like the Reader Pen Secure are very new, our investigation appears to be amongst the first of its kind (see Franklin, 2018; 2019, for an initial report on the Reader Pen Secure).

METHODS

This study emerged from a larger research project exploring the impact of assistive technology on students and instructors participating in courses in a correctional facility. This project was developed as a research partnership between the University of Calgary, Norquest College, and the Alberta Ministry of Justice. Ethics was obtained from the research ethics board at the university and the Alberta Ministry of Justice before conducting the study.

The following research question guided this study:

  ♦   How can assistive technology improve correctional education for incarcerated students with learning challenges?

Participants and Procedure

As part of the partnership, an experienced instructor from the college, which provides courses and programs in one provincial institution, volunteered to participate in the early phase of the larger project. This instructor, whom we refer to as Fiona, has 11 years of experience teaching at correctional centres. The instructor participated in the curriculum revision process, where they worked with the first author to adapt the instructional design to include the Pen as a teaching tool. The instructor taught several courses over one year, including four literacy courses and one high school course, with the Pen integrated. Using an iterative design, the process of curriculum revision included a pilot phase of four months, followed by an evaluation, reflection and revision process. Once revisions

were made to improve the student experience, the instructor continued their participation using the revised design for an additional eight months. Two interviews were conducted: an initial interview after the curriculum was revised, and a follow-up interview after one year of participation in the project. The first interview focused on the curriculum process and anticipation of how the Pen might impact student learning. The follow-up interview reflected on the instructor's experience using the Pen as an instructional tool and their perception of how the students learned using the pen. Each interview was approximately 25 minutes long. The transcriptions were analyzed inductively to reveal this experienced instructors' perception of how the use of the Pen facilitated student learning, especially for those students who may have presented with learning challenges.

FINDINGS AND DISCUSSION

In presenting our findings and discussion, we revisited our research question: How can assistive technology improve correctional education for incarcerated students with learning challenges? The findings revealed that, from the instructor's perspective, the assistive technology supported incarcerated students with learning challenges through intentional design and student agency. These aspects of learning with assistive technology in correctional classrooms are highlighted here through quotes from the interviews and discussed in light of the literature reviewed previously.

Intentional Design

Intentional design refers to instructional planning for the purposeful use of the assistive technology. This design involved integration rather than merely supplementary use. The Pen "really helps to kind of think outside the box and be able to be intentional of how you're going to implement the pen in class, and not just kind of like a supplement", (Fiona). King (2017) noted that intentional design was critical for integration of effective and mindful technology into adult learning. This instructional design allowed for differentiation. Fiona felt that "the consistency [of use of the Pen] is different with different students. With the students that started on a lower literacy level, when [she] asked them to apply [the Pen] they would" (Fiona). This correlates with the successful use of learning differentiation for lower literacy students, especially those with learning challenges, was also observed in the United States and Spain (MacArthur et al., 2001; Fernández-Batanero, 2022). However, McLoughlin and Leather (2013) stressed the need to recognize the struggles of higher-level learners, who might still experience learning challenges in the form of dyslexia. However, since Fiona usually taught lower literacy courses, it was understandable that was her focus. For these students, the use of the dictionary provided quick definitions to students as they came across unknown words. Fiona reported, "what was actually one of the places where [the students] probably used the pen more often, [was] for the dictionary function." This experience aligns closely with those incarcerated students interviewed by Tilt (2024), who "reported finding the in-cell computers were easier and more convenient than the alternatives" (p.159). Decoding and comprehension

were key uses for students who are literacy learning. The Pen provided decoding of unfamiliar words as the students easily scanned words and phrases to listen to them aloud or through their headphones. Regarding comprehension, Fiona related that with students with "lower literacy, [they] could see them not kind of understanding concepts as [they] was talking about it, especially those like the knowledge-based concepts". To aid comprehension, they then turned to the Pen. From the interview with Fiona, it was revealed that the intentional instructional design supported integration of the Pen and enabled differentiated support to students.

Student Agency

The assistive technology integrated into the courses supported several opportunities for students to solve problems and answer questions independently, exercising their agency. Fiona noted that the familiarity and ease of use meant that sometimes the students "just scanned [a text] and figured it out themselves." This agency was important because "the learners didn't always have to ask [the instructor] for everything, because they don't like doing that. And so, and some learners won't ask like, 'Oh, what's this word, or what does this mean?' They would just take their pen and do it. So that was really nice for [the instructor] and for them" (Fiona). As Merriam and Baumgartner (2020) note, adults prefer to choose how they support their learning. Choices, as an adult learning principle, benefits the student and, together with the Pen enhanced student agency by creating learning opportunities for autonomy and independence (Cloete, 2017). In particular, the students used the pen to assist in editing their projects. Fiona related that there were definitely "advantages to using the pen during the editing... it was empowering for them that [the instructor] didn't tell them ever they had to use it." Similar to the tutors in (Franklin, 2018; 2019), our instructor pointed out the advantages of intentional design and planning to support confidence building as a student outcome. The Pen could be credited with providing students several opportunities to exercise their agency as adult learners.

CONCLUSION

Literacy learning is vital for life and career success and an important skill for integration into society once released from incarceration, especially for students with learning challenges who have previously struggled with formal schooling (Lugo, 2018). In this study, the instructor, Fiona, employed an intentional design of assistive technology, specifically the scanning pen and found it allowed for differentiated support, particularly for students with lower literacy levels and learning challenges. The Pen also fostered student agency to choose how they engaged with the material. For incarcerated students with learning challenges, this means they do not have to reach out to the instructor each time they need help, but rather could be empowered to help themselves. Overall, the integration of the pen supported intentional instructional design and cultivated an environment where students could exercise their agency.

There are implications from the findings of this study on assistive technology for policymakers and decision-makers. These stakeholders are called to evaluate the landscape of available assistive technologies in their contexts and consider effective strategies for integration into existing systems. By prioritizing accessibility and support, we can ensure that these technologies enhance the lives of incarcerated students with learning challenges who would greatly benefit from them and create a more inclusive environment for everyone.

REFERENCES

Bhatti, G. (2010). Learning behind bars: Education in prisons. *Teaching and Teacher Education: An International Journal of Research and Studies, 26*(1), 31-36. https://doi.org/10.1016/j.tate.2009.06.020

Cloete, A. L. (2017). Technology and education: Challenges and opportunities. *Hervormde Teologiese Studies, 73*(3), 1–7. https://doi.org/10.4102/hts.v73i4.4589

Curwen, T., & Sharpe, G. (2012). Adult education in Canada's penal system. *International Review of Social Sciences and Humanities, 2*(2), 185-189. http://irssh.com/yahoo_site_admin/assets/docs/20_IRSSH-190-V2N2.9010228.pdf

DelliCarpini, M. (2006). Working with literacy-level English language learners in correctional education settings: Issues, challenges and best practices. *Journal of Correctional Education, 57*(3), 250-267.http://www.jstor.org/stable/23282756

Dewey, S., Codallos, K., Barry, R., Drenkhahn, K., Glover, M., Muthig, A., Roberts, S. L., & Abbott, B. (2020). Higher education in prison: A pilot study of approaches and modes of delivery in eight prison administrations. *Journal of Correctional Education, 71*(1), 57–89.

Dyslexia International (2022). *The individual.* https://dyslexia-international.org/

Fernández-Batanero, J. M., Montenegro-Rueda, M., Fernández-Cerero, J., & García-Martínez, I. (2022). Assistive technology for the inclusion of students with disabilities: a systematic review. *Educational Technology Research and Development, 70*(5), 1911–1930. https://doi.org/10.1007/s11423-022-10127-7

Franklin, C. (2018) Functional Skills Within Prisons – C-Pen ExamReader and ReaderPen Supporting Functional Skills in English, Levels 1-3 [Online]. Devon, Scanning Pens Ltd. https://static1.squarespace.com/static/56dea77e22482ee78112dd96/t/5b4c5fb08a922da49bb7c6e d/1531731892220/Final%2BResearch%2BReport%2B2018.pdf (Accessed 1 September 2018).

Gormley, C. (2022). The hidden harms of prison life for people with learning disabilities, The British *Journal of Criminology, 62*(2), 261–278, https://doi.org/10.1093/bjc/azab061

International Dyslexia Association (2020). *Adolescents and adults with dyslexia.* https://dyslexiaida.org/

King, K. P. (2017). *Technology and innovation in adult learning* (First edition.). Jossey-Bass.

Kirk, S., & Bateman, B. (1962). Diagnosis and remediation of learning disabilities. *Exceptional Children, 29*(2), 73–78. https://doi-org.ezproxy.lib.ucalgary.ca/https://doi.org/10.1177/001440296202900204

Learning Disabilities Association of Canada. (2024). *When learning disabilities in adults go undiagnosed.* https://www.ldac-acta.ca/causes/for-adults/

Lugo, L. (2018). The 3 Rs: Raise the educational bar, reduce recidivism. *Corrections Today, 80*(3), 40.

MacArthur, C. A., Ferretti, R. P., Okolo, C. M., & Cavalier, A. R. (2001). Technology applications for students with literacy problems: A critical review. *The Elementary School Journal, 101*(3), 273–301. https://doi.org/10.1086/499669

Mastrorilli, M. (2016). With Pell grants rising: A review of the contemporary empirical literature on prison postsecondary education. *Journal of Correctional Education, 67*(2), 44-60.

McAleese, S., & Kilty, J. M. (2020). Walls are put up when curiosity ends: Transformative education in the Canadian carceral context. *Journal of Prison Education & Reentry, 6*(3), 275-293

McBride, C. (2019). *Coping with dyslexia, dysgraphia and ADHD: A global perspective* (1st ed.). Routledge Taylor & Francis Group. https://doi.org/10.4324/9781315115566

McLoughlin, D., & Leather, C. (2013). *The dyslexic adult: Interventions and outcomes - an evidence-based approach.* John Wiley & Sons, ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/ucalgary-ebooks/detail.action?docID=1124434.

Merriam, S. B., & Baumgartner, L. (2020). *Learning in adulthood: A comprehensive guide* (Fourth ed.). Jossey-Bass.

Tilt, S. (2024). *Exploring Prisoners' Use of Personal Computers. Doctoral Thesis,* Nottingham Trent University. ProQuest Dissertations & Theses.

Zhang, S. (2006). Preventing parolees from returning to prison through community-based reintegration. *Crime & Delinquency, 52*(4), 551-571. https://doi.org/10.1177/0011128705282594

Dyslexia and Crime: the 'school-to-prison' pipeline and why it happens

Neil Alexander-Passe[1*]

1   *City and Islington College; Department of Education; SEND Researcher and Author; UK*

Abstract

Background: *This paper is drawn from the author's wider studies of the school-to-prison pipeline, investigating how the seeds of crime start very early in mainstream education, through the lack of effective screening and assessment; and how unaware teachers make certain judgements about young children which ignore underlying existence of underlying learning difficulties. It is known that 65% of UK prisoners have a reading age of 11 years old, which questions the effectiveness of UK mainstream educational systems. It is also known that the vast majority of those with dyslexia leave school without a diagnosis.*

The study: *This paper takes a deep empirical examination of data regarding how those with dyslexia are screening, assessed, and supported at school. Their avoidance strategies and due to labelling as bad and naughty are treated accordingly, leading to suspension and exclusions. This often leads to alternative education provisions, where as vulnerable young people are exposed to crime and gangs. As first crimes, a cry for help, are not recognised as such, this begins to desensitise them to crime, and grifting into crime as a career due to few post-school career opportunities.*

Discussion: *The paper explores critical questions, including whether neurodivergence should be a mitigating factor in sentencing, how guilty pleas may be influenced, and whether alternatives to prison could be more appropriate for undiagnosed individuals.*

Results: *This paper does not advocate that crimes from those with dyslexia/neurodivergence should be ignored, but if arrested, such individuals are screened for learning difficulties and supported when arrested and questioned. This paper discusses hard-hitting evidence that those with dyslexia/neurodivergence have commonly been mistreated during their 12 years of mandatory education (6-18 years old), time in alternative education, time in the criminal justice system, and finally in prisons. This paper aims to raise awareness to effect change in teacher and police training regarding dyslexia.*

Keywords: Dyslexia, Neurodivergence, School-to-Prison Pipeline, Undiagnosed Learning Difficulties, Educational Exclusion, Youth Crime, Criminal Justice System, Teacher Training, Police Training, Vulnerable Youth Recidivism, Prison Education

* Correspondence to:
Dr Neil Alexander-Passe, Examination Access Assessor at City and Islington College, London. Consultant Inclusion Expert at the Department of Education, London. SEND Researcher, Dyslexia-Research.com and Author. Email: neilpasse@aol.com

INTRODUCTION

This paper was researched and written by a former UK school SENDCO, a special educational needs coordinator. He is also a PhD level researcher who has specialised in school-based trauma with a range of neurodiverse needs, especially dyslexia.

This paper is part of a much wider neurodiverse study investigating the 'school-to-prison pipeline', which looks at how the effects of school are a critical and crucial part of this pathway. How dyslexia is screened for, diagnosed, and all the way to support in the classroom. But, crucially how things can go wrong, what happens when this happens, and the effects and knock-on effects leading to involvement in crime and the criminal justice system.

The author wishes to apologise for focussing on the negative side of school, and what can happen to some, not all, with undiagnosed dyslexia, which can place them in harms way in mainstream education. As vulnerable young people, many with undiagnosed dyslexia can feel helpless in educational environments that focusses on that they 'can't do', rather than what they 'can'. Having undiagnosed dyslexia until he turned 14 years old, the author personally relates to the harshness of UK mainstream education, and though his research aims to raise awareness and effect change.

Dyslexia is a fascinating condition, which can be argued to be both a difficulty or disability. It is covered under disability discrimination legislation in the UK and USA, which offers protection along with other hidden disabilities such as stammering and mental illness in both educational and work environments.

As a hidden disability, it can be easily camouflaged and offers a sense of 'normality' to those struggling. However, this can be a double-edged sword as without asking for reasonable adjustments, barriers will be harder to overcome. Any disclosure offers a means to gain help, however, it can result in some individuals becoming embarrassed and can in some instances open individuals up to negativity, especially in the workplace e.g. bullying. When 'reasonable adjustments' are made in the workplace this can have a positive impact, such as technology solutions such as a grammar and spell checker, and someone to proofread letters before they go out.

Challenges at school

Children or teenagers can face numerous difficulties due to diagnosed or undiagnosed dyslexia. Some estimates suggest up to 85% of young people with dyslexia are still undiagnosed after 10 years of mandatory education (Ridley, 2023). In the main, it remains unidentified as most schools do not screen nor diagnose dyslexia. As a 'Special Education Needs and Disabilities Coordinator' (SENDCO), this author knows first-hand how dyslexia is commonly seen as lower of a priority, compared to other difficulties such

as autism and ADHD. Interestingly, school leaders perceive that class teachers are able to effectively provide for the needs of students with dyslexia. However, in a typical mixed-ability class of 30 students, this commonly is not the case.

Those with dyslexia if not taught properly can face problems in the following areas:

- ♦ Difficulties learning to read/as well as reading fluently
- ♦ Difficulties comprehending what they read
- ♦ Difficulties remembering and recalling facts
- ♦ Difficulties tying shoelaces and ties
- ♦ Messy handwriting
- ♦ Difficulties remembering sequences
- ♦ Difficulties hearing phonetics, thus spelling what they hear
- ♦ Letter reversals

To cope they may (Alexander-Passe, 2015):

- ♦ Avoid writing
- ♦ Avoid reading aloud to others
- ♦ Use smaller words that they can spell rather than the more complex words that would demonstrate their abilities and intellect
- ♦ Not correct spelling or grammar, as this will only make the piece of writing look untidy and messy
- ♦ Rely on OCD-type sequences or routines to not forget to do things
- ♦ Have a smaller circle of friends
- ♦ Rely on others to check their work
- ♦ Self-doubt of their abilities
- ♦ Try to use technology

The following may occur (Alexander-Passe, 2015):

- ♦ Avoidance of reading and writing
- ♦ Humiliation from teachers and peers
- ♦ Exclusion from social groups based on performance rather than potential
- ♦ Frustration caused by lack of differentiated/adapted teaching
- ♦ Learned helplessness
- ♦ Self-doubt

The emotional cost can often result in (Alexander-Passe, 2015):

- ♦ Self-doubt
- ♦ Depression and anxiety
- ♦ Self-harming (food, cutting, risks, drug abuse)
- ♦ Suicide and attempted suicide

One educator (Thompson, 2022a) noted: *'Not being able to read isn't just embarrassing for children, it can be traumatic'*, and dyslexia is a *'Drip ,drip, drip of shame'* in mainstream school classrooms. Children who can't read feel ashamed, and he noted that *'shame and frustration is pervasive'*. His daughter is also dyslexic and struggled to read. When his daughter was only 5 years old, he found her picking at her skin. *'I'm picking myself apart'*, she said at the time. *I'm picking myself apart, so I'm not here anymore'*. School can be humiliating for a child with a reading difficulty, it's no surprise that some children struggle with their mental well-being.

Day (2022) describes some of the challenges facing neurodivergent children within education, these can include long periods of disengagement and/or non-attendance from school; and difficulties understanding the behavioural expectations within a classroom, including verbal directions and class rules (Hughes & Peirse-O'Byrne, 2016). They note these can be wrongly interpreted by teaching staff as 'bad' or 'disruptive' behaviour, rather than indications of a child struggling to cope and function in a school environment.

The school experience of prisoners in UK prisons

This paper is interested in why many with dyslexia/literacy difficulties can be found in UK prisons, investigating if educational rejection is one of many reasons behind their turning to crime.

Quotes from prison inmates with dyslexia speak volumes about how school was for them, and why they withdrew (physically and emotionally) from mainstream education (Prison Reform Trust-PRT, 2018):

- *"I hated school. Because of my dyslexia – I don't think they knew how to work with that. I spent the whole time thinking 'I can't do that'. It was only when I was older that I got into education, and I suppose I realised I could do it."*
- *"It was the same for me. I spent the first 40 years of my life being told I can't do anything and was stupid. That's why receiving that letter from PET (Prison Educational Trust) saying I'd been funded; it is difficult to express how amazing that was – that someone was believing in me."*

Several studies highlighted the various strategies used in school to cope:

- *"Dyslexia wasn't recognised when I was at school, and I would often mess around in the classes to hide my insecurities. This would usually get me kicked out of class or even suspended on some occasions, which at the time felt better than being embarrassed by not being able to do the work."*

♦ *"Over the years after leaving school, I've managed to create coping strategies which help me manage its effects, and although reading, writing and spelling can still be a challenge – I have discovered dyslexia does have its benefits."* (Prison Reform Trust (PRT), 2022)

♦ *"When I was young, I'd struggled a lot with undiagnosed dyslexia, so had no qualifications when I came into prison."* (PRT, 2022)

♦ *"I was bullied at school; I was left-handed, plus I was diagnosed with dyslexia. That may have been a reason why I didn't like school."* (PRT, 2008)

Prisoners with undiagnosed learning difficulties had similar experiences (PRT, 2008):

♦ *"I didn't like school; I didn't understand anything."* Young offender.

♦ *"I didn't learn anything from school…I was at school from seven to sixteen years old and I still couldn't read or write when I left."*

♦ *"It was better being at school than being at home, my mum was a drug abuser, and she was always in bed. She never made any tea."* Woman prisoner.

♦ *"I went to a backward school between the ages of six and eleven."* Woman prisoner.

♦ *"I went to an ordinary school up until I was eight years old and then I went to slow school. It was alright there; it was for people who couldn't read or write."*

A number of prisoners highlight their time in special or alternative education, but these seem to be due to behaviour manifestations (PRT, 2008):

♦ *"I went to a secondary school, but I was kicked out of there. I went into care and went to different foster homes and secure units. Then I went to a special school, it was like a bad behaviour school, but after that, I hardly went to school [at all]. I never seemed to settle down anywhere. When my dad left home the family fell apart, there was no routine and my mum fell apart and went off the rails."*

♦ *"I was only there for a year then I got put in a special school. Then I went back to school for three months; I tried to burn the school down and was put into care. I was always getting suspended for fighting."*

♦ *"I went to a special school; I was very unconfident and struggled with spelling and maths. When I got things wrong, I just shouted."*

♦ *"At first, I went to a mainstream school, then two months into year eight they tricked me and my mum, they wanted to send me to a special school on a trial basis, but they wouldn't let me back and from there my life went mad. I started bunking off and stealing cars."* young offender with borderline learning disabilities.

Avoidance

Avoidance is one of the main coping strategies for young people with dyslexia (diagnosed or undiagnosed), and these can include:

♦ Losing/breaking their pencil or pen to avoid writing in class, or writing for a class test
♦ Forgetting their glasses, or saying they need glasses to read in class
♦ Avoiding the teacher's radar, making eye contact with them, so as not to be called upon to answer questions
♦ Forgetting homework on purpose to avoid getting red lines drawn through spelling mistakes or being marked down for poor handwriting, relying on the teacher to forget to ask for it in the next lesson
♦ Using smaller words, they can spell rather than more complex words they know but can't spell – therefore avoiding the use of a dictionary and the wrath of the teacher for misspelt words
♦ Avoidance of tests by going to the toilet at critical times
♦ Avoid using a dictionary to find spellings, as it takes too long as they don't know how to spell the start of words.
♦ Being sent out of the class to avoid a test, maybe swearing on purpose, or hitting someone
♦ Being the class clown to make others laugh, so they are not seen as unable to do well on tests
♦ Breaking their arm, hand, or fingers to avoid writing for a longer period

Avoidance is part of a huge strategy likened to self-preservation, to maintain self-esteem, rather than be seen as of low intelligence or lazy, than stupid for not being able to spell words:

♦ *"Many dyslexics, if not most, are very good at creating coping strategies and adapting their day-to-day life to avoid situations in which they are hampered by their dyslexia. Certainly, the vast majority of them never become criminals. Being a Member of (the UK) Parliament, I am well aware that many members of the public think that the two are very similar. It is also true that a significant number of dyslexics will avoid any situations in which they have to read or write. If that aversion to reading and writing is severe enough to make it daunting even to fill in a simple form, they are lost. Basic literacy is essential for interacting with the rest of society, and illiteracy can be a source of immense frustration and impoverishment and, of course, a factor in crime."* (Harris, 2012)

Before she took a job at Edinburgh University as a lecturer, Jane Kirk was the principal teacher of learning support services at a Scottish mainstream secondary school and had

worked in specialist schools in Glasgow and Aberdeen. She has seen how undiagnosed dyslexics coming up from primary school start avoiding tasks they can't cope with and become steadily more impertinent, disruptive, and destructive:

♦ *"They are sent out of class, then excluded for a week, then expelled. And that may be when they begin to mix with the local criminal fraternity."* (Adams, 1999)

The teacher relationship

Teachers often find dyslexic children a puzzle to teach, as they are commonly strong orally, but struggle to record their ideas on paper. This means they can often be perceived as lazy or stupid as they know the information, but are perceived to be reluctant to record it. Whilst dyslexia awareness in schools is improving, many teachers still feel unable to recognise a dyslexia child, made worse by their advanced collection of avoidance/camouflaging strategies. (Hopkins, Clegg, & Stackhouse (2016) noted participants' self-confidence was negatively affected by the way others communicated with them.

Teachers spoke to them negatively, for example in a patronising or aggressive way, due to the frustrations they experienced (Hopkins, Clegg, & Stackhouse, 2016):

♦ *"Certain teachers will treat you as though you are dumb and will talk to you like you're a little kid"*, Youth offender.
♦ *"School just thinks you're dumb, you can't accomplish anything. No faith in you at all, so it just puts you down"*, Youth offender.
♦ *"They just make you look like twats in primary school."*
♦ *"Teachers, they make you feel wee big, don't they?"*

Young people in Hopkins, Clegg, & Stackhouse (2016) noted disaffection with the level of support they had received from teachers. A lack of help with comprehension led to feelings of frustration, which would often lead to further confrontation with teachers and disengagement in class, a vicious cycle. Teachers became frustrated in response to participants' inability to comprehend what was said and how they responded in such situations. Young people were often embarrassed by negative comments from authority figures, mainly teachers and police. Sanger et al. (2000) argue that feelings of disrespect and inequality increased young people's conflict and aggression with authority figures.

Most young people in Hopkins, Clegg, & Stackhouse (2016) had low self-confidence concerning their educational attainment and communicative ability, due to the negative way in which others would speak to them. This supports other research findings with young offenders (Sanger et al. 2003, 2000; Bryan, 2004) and children with emotional-behavioural problems (Cohen & Lipsett, 1991; Redmond & Rice, 1998, Dishion & Andrew, 1995). As a result of low language abilities, poor behaviour, and low self-esteem, they

may find themselves excluded from mainstream education and their 'typical' peer group. This can lead to associating with peers who have also had negative experiences of school education, and regard delinquency and risky behaviour as the key to their group identity (Tanti et al., 2011; Light & Dishion, 2007).

Hughes (2015) argues that individuals with deficits have a heightened need to be accepted by their peer group, and therefore learning difficulties/disabilities increase the risk of engagement in criminality, whether it's increased vulnerability to being a victim of victimisation, or being drawn into making unsuitable choices to please and be accepted by others.

Teachers often talk about the satisfaction and impact they have had on young learners; however, the dyslexic learner is unlikely to be among those students due to their poor transferal of information from short to long-term memory. The teacher, like a parent, will feel that the hour's work to learn some facts or timetables will be well spent, until the next morning when the information has been forgotten, making the teacher or parent frustrated in the efforts made have left little or no impact, thinking *'why even bother!'*.

This is along with young people with dyslexia working hard and completing work, and then receiving their work back from teachers with red marks (some now use purple to be less dramatic) all over it for poor spelling, grammar, or presentation, but ignoring their content. How long can someone take this before giving up?

♦   *"I speak as a dyslexic myself. I know exactly how embarrassing and frustrating it can be to work very hard in school on a piece of work, coming up with all sorts of fantastic ideas and arguments, only for the teacher to hand it back with red marks all over it because of poor spelling or grammar. That is soul-destroying. I also know what it is like to be told that I am stupid or lazy, or both. It does not take long for someone in that situation to feel that they cannot trust their judgment about themselves or their peers and others around them."* (Harris, 2012)

Teacher perceptions are important, but these can unfortunately affect the amount of effort they will put into individual students. Criminal Justice (2022) found schoolteachers and administrators treated students differently according to their perceptions of the student's intelligence, thus giving negative labels and fewer educational opportunities to those whom they saw as less intelligent. These labels and constrained opportunities in turn produce feelings of alienation and resentment that can lead students toward delinquent peers and criminal behaviour. As such, society's reaction to intelligence, or lack of it, can lead to increased criminal behaviour opportunities. Fortunately, studies have identified this as 'Secondary deviance', as part of the Labelling theory. As Becker (1963) puts it, *"deviance is not a quality of the act the person commits, but rather a consequence of the application by others, of rules and sanctions to the offender. The deviant*

is one to whom the label has successfully been applied; deviant behaviour is behaviour people so label" (Little, 2022).

Labelling at school

Day (2022) argues from a study, that a 'typical' trajectory through education and the youth justice systems began by children displaying disruptive and challenging behaviours from Years 4–6 in primary school (aged 8–11). Being labelled according to their behaviours, many of which were 'traits' associated with various neurodivergent conditions, tended to escalate the stress and being overwhelmed by formal education environment. The 'bad' or 'naughty' label followed the child as they made the disruptive and difficult transition to secondary school. Very often, as supported by Government data (Office of the Children's Commissioner, 2021), by years 8 or 9 (aged 13-14), the child had been labelled as a 'problem child' and entered a pattern of suspensions, leading to eventual permanent exclusion from mainstream education.

> ♦ *"Eddie had been diagnosed with ADHD whilst at high school but still felt labelled according to his behaviours, which were ingrained by his teachers. Eddie identified that after being moved around several schools and acquiring a label of a 'problem child' and 'class clown', the only way he could express that he did not like school was through his behaviour, meaning more moves, placing him in a vicious cycle."* (Day, 2022)

It was not just Eddie who described moving around several schools. This was a strong theme for most children in Day (2022). Some described being sent home and de-registered (off-rolling), as found in previous studies and reports (Gill, Quilter-Pinner & Swift, 2017, House of Commons Education Committee, 2018). The long periods of disengagement, often because of children struggling to understand the instructions within a classroom have been previously identified as a particular challenge facing neurodivergent children (Hughes & Peirse-O'Byrne, 2016). The periods of instability, disengagement and disruption tended to exacerbate challenging behaviours, placing the children in a vicious cycle of labelling, and disabling. Even when the children were placed in a specialist provision, such as a Pupil Referral Unit, the same pattern continued as in mainstream education.

Suspension/Exclusion from school and playing truant

Responses to stress and trauma are commonly known as the 'flight, flight or freeze' response (Frothingham, 2021). Those in 'fight' or 'flight' mode tend to take action to avoid or confront danger, while those in 'freeze' become immobile. In the case of those with dyslexia, it is common for many, especially school-aged boys to take a 'flight or fight' response, either truanting to avoid a test or getting into a fight to be sent out of the room by exhibiting their frustration. Either way, they are seen as having behaviour

manifestations and are punished severely for this. Alternatively, some boys become the class clown to make their peers laugh. In both ways, the aim is to retain self-esteem and not to be seen as 'stupid' for being unable to spell or read aloud in class. The mantra is 'better to be seen as funny or crazy, than stupid'. Girls alternatively tend to freeze/withdraw and can be seen to disappear in class. Peers often say that they don't see or hear them in class, and they resurface as the lesson ends. Avoiding the teacher's radar is key to their survival.

Research by the Prison Reform Trust (2008) found inmates with specific learning disabilities/difficulties were three times more likely to have been excluded from school than their comparison group of non-prisoners, 51% compared to 17%, which was found to be statistically significant. Almost 75% said they had played truant, compared with just over 50% in the comparison group. As a comparison, prisoners with possible learning or borderline learning disabilities were slightly more likely to have played truant and to have been excluded from school than non-learning disability prisoners.

The question is always what young people will do when they are truant, and whether they are truant alone or with others. The following suggests that when the novelty wears off, and they seek to do something productive which is more fun than school, they tend to increase their status through vocational activities (e.g. stealing, selling drugs etc) which seem more attractive and earn them money:

♦   *"Spelling tests were on Fridays, and Baraka skipped school to hide in the hallways of the housing project where he lived. By the sixth grade, he was fed up. He decided to drop out and start selling cocaine. At age 23, he was in prison for a drug offence. But after being diagnosed with dyslexia and finally earning his GED (school diploma), he said "I started viewing myself differently. When I learned to read, it freed me." (Ankney, 2019)*

♦   *"Mikey took the criminal path after truanting from school. After a series of offences, he was sent down for robbing a garage. He admits he's still bad at writing and, with other inmates at Polmont Prison, goes to basic skills classes. As well as Mikey, we meet Thomas - aged 18 and convicted four times already for house burglary. His education seems to have been a write-off. Although he was asked to leave five primary schools for bad behaviour and bullying, his learning difficulties were never examined so his dyslexia went undiscovered." (Adams, 1999)*

Day (2022) reports on the disproportionate exclusion from the education of neurodivergent children and/or those with an identified SEND (Special Educational Needs and Disabilities) remains an ongoing challenge. It is accepted that children in England and Wales with identified special educational needs and disabilities (SEND) are at least 7 times more likely to be excluded from mainstream education than their peers (Gill, Quilter-Pinner, & Swift, 2017). In 2018-19 UK children with SEN accounted for 44% of

all permanent exclusions, and 82% of permanent exclusions in primary schools (Office of the Children's Commissioner, 2021). Children at the SEND support level at school (had SEND needs but with no additional funding set aside for their education) were twice as likely to be excluded from school as children with EHCPs (SEND needs with additional funding) and at over 5 times the rate as children with no identified SEND. This may be due to the strength of exclusion guidance, which states that head teachers should do everything in their power to avoid children with EHCPs being permanently excluded. This can lead to children, being perceived to be trouble and without EHCPs being 'off rolled' or excluded faster by schools.

Where children are excluded from mainstream education, Day (2022) argues they are typically sent to an Alternative Provision (AP) which is usually a Pupil Referral Unit (PRU). In 2018-19, one study found that 81% of UK children in Alternative Provision had an identified SEND (Office of the Children's Commissioner, 2021) however, most did not have a diagnosed need. However, despite this, there is no nationally required routine screening process in place for neurodivergent traits for excluded pupils (Healthcare Commission and HM Inspectorate of Probation, 2006). There is also evidence that after the exclusion, children are more likely to be identified as having a SEND than a child who has not been excluded. The Office of the Children's Commissioner-OCC (2021) reports that this reflects the reported experiences of parents who claim that their child was excluded because the school failed to understand and meet their child's needs. Pressure is also placed on parents to home-school such children rather than their child gaining the sigma of being 'excluded'. In 2013, the OCC found that 1.8% of schools admitted to encouraging parents to take their child out of school and home-educate as a form of hidden exclusion. By 2017, this figure had increased by 78%.

Evidence was also found by the Education Committee of Schools (in Sanger et al., 2003) that schools were deliberately avoiding assessing children with suspected SEND. Excluded children can save a school thousands of pounds, and it is more difficult to exclude a child with SEND than a child with unidentified needs. Off-rolling means that children lack the same levels of protection or support offered by the formal exclusion processes that place several duties upon a Local Authority (Timpson, 2019; Office of the Children's Commissioner, 2017). It has been argued that the system within which schools are operating appears to financially incentivise the exclusion of children with unidentified SEND needs (Gill, Quilter-Pinner, & Swift, 2017).

The 'school exclusion to prison pipeline' has been well evidenced across many studies (Berridge et al., 2001; McAra & McVie, 2010; Sanders et al., 2020; Timpson, 2019; Alexander-Passe, 2023, 2024). However, despite this acceptance, it is acknowledged that understanding the causality of offending as a linear relationship between exclusion and criminality oversimplifies what is often a complex interplay between a range of factors (Arnez & Condry, 2021; Berridge et al, 2001; Case & Hazel, 2020).

Alternative provision (AP) and Pupil Referral Units (PRUs)

The House of Commons Education Committee (2019) indicated that alternative provision is too often seen as a forgotten part of the education system, side-lined, and stigmatised as somewhere only the very worst-behaved pupils go. All pupils deserve a high-quality education, and while this is often the case, too many pupils are failed by the system, and they are not receiving the education that they deserve.

Alternative provision is a broad term and imperfectly describes a wide variety of types of school or educational settings: Pupil Referral Units (PRUs); alternative provision academies and free schools; hospital schools; and provision delivered by charities and other organisations as well as independent or unregistered schools. Children enter AP when they have been excluded from mainstream education; or are unable to attend for medical reasons; if they are pregnant or are caring for their children; or if they are without a school place because they have left a custodial placement; and as we found out if they are not in a mainstream school for other, often less legitimate reasons. In many cases, the House of Commons Education Committee (2019) noted they are pupils who have been failed by the mainstream school system.

The numbers excluded by the school have risen greatly over the last decade, by a 40% rise from 2017 to 2019, with 339,360 young people gaining a suspension and 6,685 being permanently excluded in 2019. Newer data by the Department of Education (2024) reported that there were 787,00 suspensions in 2022-23, and 9.376 permanently excluded in the school year 2022-23. This is a huge rise in suspensions, from 578,280 in 2021-22 to 786,961 in 2022-23. Investigating the 2022-23 data, persistent disruptive behaviour accounted for 48% of all suspensions and 39% of all permanent exclusions. Disruptive behaviour and education disaffection by those with undiagnosed/unsupported SEND needs are argued to be correlated.

The House of Commons report (2019) noted that many excluded were due to behaviour concerns, but the research also points to the majority of those excluded as having undiagnosed special educational needs upon referral, suggesting the young person's behaviour was the result of undiagnosed and unsupported special educational needs, hence why the House of Commons Education Committee (2019) argues that APs are full of *"pupils who have been failed by the mainstream school system".* They also found that schools reported it was harder to exclude a child with SEND, so left them deliberately undiagnosed for ease, indicating an inability or unwillingness to identify problems and then provide support, starting from a very young age (sometimes year 4, being 8 years old). So, they arrive at AP with unidentified and unmet needs.

The House of Commons Education Committee (2019) also found evidence that schools were off-rolling (removing) children from their school census, these tended to be those with unmet SEND needs who manifested through poor behaviour. This allows schools to

promote attainment data that is favourable for league tables, camouflaging the real need in their cohort.

APs also noted an increase in children being referred to them with mental health needs, this can also be the result of unidentified or unmet in mainstream education. It could be argued their behaviour/mental health needs were secondary manifestations of underlying undiagnosed SEND.

Being bullied at school

Those with dyslexia can easily be classed as 'vulnerable', lacking the ability to reliably read, write and advocate for themselves. They are commonly, from a very young age, put on the learning table for the slowest children, given a cute name e.g. the purple or ladybird table, and labelled as 'lazy or stupid' by teachers and peers, and other children seeing this vulnerability as 'ripe' for bullying in the playground and classroom.

Reasonable adjustments for exams

Schools often offer extra time, a scribe, or a reader to lower-attaining students. However, schools very rarely offers training to these students to make the best use of such allowances. Due to the role of status, many who need it the most will not use such allowances, especially if they are taking the test in the same room as their more able peers. The author is a qualified examination access assessor and finds many schools do not screen all students to see if they need such extra allowances, only the small group who have severe needs are assessed. In this author's previous schools where he has taught, he screened all students in both year 7 as they enter the school, and then again in year 10 for examinations, this means barriers to learning are supported earlier.

Educational disenfranchisement

The role of the school teacher is to differentiate and adapt the school curriculum to the needs of each child in their class. However, in mainstream UK schools, this can be up to 30 learners of mixed abilities e.g. high, medium, and low abilities; students with special educational needs, gifted and talented, 'pupil premium' from low-income families, new to English, and in local authority care. This concept of supporting the needs of each learner in their class may seem utopian, however, it is legislated in the UK as part of teacher professional standards but is rarely achieved even by the most experienced teachers.

Typically, those with dyslexia will manifest a significant difference between their verbal to written abilities, which leads to them struggling to demonstrate their true abilities on paper. Unfortunately, we live in a society and especially a school system that makes judgements on a person's abilities, based on their written output e.g. GCSE examinations are written-based. This causes a conflict in the eyes of adults, especially teachers who

perceive young dyslexics as 'can't be bothered' to translate their great oral ideas into written essays or homework, and therefore labelling them as lazy.

Based on their written ability they are placed in academic sets which are far lower than their intelligence/ability (if measured from their oral responses to questions), and so their peer group is usually those who are of lower ability and who commonly feel disenfranchised (feel rejected) by school. Schools do not tend to grade oral responses, and even giving extra time is not a true 'reasonable adjustment', since giving a student more time is not going to help them spell a word correctly or know where to correctly place punctuation.

Therefore, the high-ability young people with dyslexia are stuck in lower-ability sets, and they can soon become disenfranchised, when they see that others are messing about rather than learning, they follow suit. They follow their peer group who also do not enjoy school, so begin to avoid tests and truant, as school is unsuitable for them – so voting with their feet! Young people/teenagers are highly influenced by their peer group, who are more trusted than parents, so will follow them wherever they go and whatever they do. Mixing socially with these individuals will also place them at higher risk of criminal activity.

Gangs and the wrong crowd

Those with difficulties such as dyslexia or low ability will struggle in mainstream educational settings, no matter how hard they try. Threats by parents/teachers to work harder (e.g. punishment for bad grades) will only push them away and disengage them, and they will seek others, namely their school peer group, for friendship and mentoring. All young people are impressionable, and friends have huge influences on them, which commonly translates into their behaviour, and how they react to their environment.

The young dyslexic will seek role models, and when parents and teachers are unable to fulfil this role, as they tend to focus on what the young person 'can't do'. The young person will seek alternative peer groups and role models for moral and emotional support, mainly drawn by those they mix with at school, likely to be others disenfranchised by education and placed in the lower sets for learning.

For example, if their school peers are going out for the evening, this group may mess about riding their bikes and if one person brings alcohol or drugs, they can be sucked into experimenting with them, and apart from being at risk of addiction, can lose their inhibitions or feel peer pressure for acceptance, and do acts which they would not normally be consensual to do, such as petty crime e.g. stealing from shops, mugging, or property damage such as graffiti and damage to cars.

The wrong crowd can have an immeasurable influence on young people, and this author

has personally experienced what can seem like a trip to a harmless club with friends can turn into dropping off someone at a car which has been targeted for stealing, for them to re-join the group later with extra spending money – normalising criminal actions.

Escapism (depression, self-harm, substance abuse)

Many young people with dyslexia feel alone in their troubles, feeling that no one else has similar problems to them at school, socially, and in their own families. They feel there must be something wrong with themselves, as everyone else seems 'normal' compared to them. Interestingly, if parents acknowledge their own school and workplace difficulties (as dyslexia normally runs in families), then the young dyslexic, even undiagnosed, can feel they are alone and misunderstood.

The young person in the lowest classes at school will also be commonly socially excluded from groups they aspire to, as schools are a collection of social clique groups e.g. geeks, swots, sporty, girly-girls etc.

The 2000 report on Doncaster Prisons by The Cascade Foundation indicated 85% of those with dyslexia, suffered from school-age mental health issues, underlying high levels of depression, poor self-esteem, and lack of confidence (Hewitt-Main, 2020).

A young person with dyslexia may feel socially excluded, as they may struggle to know the right thing to say or be unreliable with sports or social activities e.g. unable to pass a football, catch a ball, not being on time and at the right place. This social exclusion, along with helplessness at school for their academic work, can mean they can develop self-protective conditions such as depression, anxiety, and other emotional and mental health difficulties. This can often lead to escapism, to regain a sense of control, sometimes with the use of drugs, alcohol, self-harming, and risk-taking activities. However, such habits can themselves lead to pathways to crime, enabling them to buy drugs or alcohol on an ongoing basis.

The knock-on effects of mental health difficulties are seen in the broader youth offending and prison population, with a lack of awareness by service providers and, thus a lack of provision being offered.

A Youth Justice Board project in 2005 investigated a random sample of 100 young people subject to a detention and training order or those deemed at risk of offending and involved in a youth inclusion program (Arad Consulting & Evans, 2009):

- Over 66% had been in local authority care at some point
- Nearly 33% had mental health difficulties
- Just over 50% had been dependent on a substance

First crimes

First crimes are often gateways to more serious offences, commonly starting out as dares and as the individual is not immediately being caught or punished; this can quickly desensitise them to such offences, leading to an increase in more risky crimes. Like drugs, smaller crimes can be a gateway to more advanced crimes. It could be argued the adrenaline rush is like that of stimulant drugs. To regain the same rush, you need greater crimes or risks, or more powerful drugs to achieve the same level of adrenalin. First crimes can vary according to location, in some cities stealing is a gateway crime, in others, it's dealing or couriering drugs around the country (called country line crimes).

The young dyslexic can revel in the praise they gain from their peers from activities with nothing to do with reading, writing, or spelling. The praise from their peers is based on what they 'can do' rather than what they 'can't do', and this can be elating compared to the embarrassment of being laughed at for what they 'can't do' at school. Parents and teachers can find this hard to understand, as they are never likely to have faced failure on an hourly and daily basis, in tasks and skills that they perceive as basic.

The Office for National Statistics (2018) found young people commonly (86% of violent incidents), commit crimes towards pupils at their school, such as towards a friend (including boyfriend or girlfriend) in 13% of incidents. This supports the concept that committing a crime can be status-based, related to seeking retribution against those who have bullied them, maybe for their perceived low academic ability.

A misread cry for help

It is a reasonable hunch to suggest that students with specific learning difficulties are likely to have lower language skills, and a cry for help can be more physical, as they lack the words to say what's needed, which can get them into trouble at school and may lead to referrals to youth offending teams. In many ways, this is like a baby crying and parents being at a loss as to what the baby needs (change of nappy, being hungry, or tired) (Thompson, 2022c):

- ♦ *"Students with learning disabilities or behavioural health issues may also unwittingly commit a crime while acting out of frustration. If observed at school by youth offending team staff…. those crimes get elevated to the juvenile justice system, Fogg said. "Once you enter the system, you're a delinquent or you're known to be 'in juvie' or 'in court,'"*
- ♦ *"And I think we often overlook the traumatic experience of labelling them. Often it starts a trajectory of 'Oh, I'm bad, and this is now the path I'm going."*

Research by the author into dyslexia and suicide found that the reported levels are very low, however under investigation, only suicides where the individual has left a suicide

note stating dyslexia as the cause, would it be recorded. Lacking the ability to write a letter describing their pain is unlikely with a person with dyslexia, so the causes of such suicides will remain unknown.

Fogg from Disability Rights North Carolina (Thompson, 2022a) explained that some of the most common complaints children with disabilities come to her with are crimes like making threats against the school or school officials:

♦ *"It's a cry for help"*
♦ *"Making some completely outlandish statement that they know is going to get the attention of the adults in their world, because that's how high their anxiety has gotten."*

For many students with disabilities, a school is a place where they can be humiliated and frustrated. It's a place they dread going to, Fogg said. If they know they can be suspended by acting out, they might do so on purpose:

♦ *"They're trying to get out of that school environment, which is one of the reasons that we argue against suspension"* Fogg said. *"It's encouraging that behaviour, even though that may not be immediately obvious."*
(Her Majesty's Prison and Probation Service and Ministry of Justice, 2022)

Children can manifest behavioural problems as they struggle at school. Schools tend to punish poor behaviour, but rarely ask about the reasons behind it, which might be due to teasing or bullying, being called 'lazy or stupid' in a class by their teachers, often translated by peers to mean a child is a vulnerable and easy prey. This could be a 'fight' response to stress and anxiety when they hit back at bullies.

Status and Crime

Patterns began to form in this investigation, to explain the types of crimes undertaken by those with dyslexia. It could be argued they are status-based, as in the classroom young dyslexics feel inferior and this can make them feel frustrated and angry, thus the young dyslexic can turn to crime to rebalance this status quo, placing them in charge, in a powerful position.

As one ex-criminal interviewed for this investigation noted, whenever they were belittled by teachers and their peers, they made sure that as soon as they got out to the playground they would bully or beat someone up, as a result, to retain their status in the classroom.

Status plays a big part in the crimes chosen: stealing, robbery and violent crimes being a visual demonstration of their prowess, like a lion being the king of their pride. Many

dyslexics will choose to manifest their frustration through overtly behavioural means, like being the class bully or the class clown. Much of this comes from their inability to attain status through academic endeavours, so they use their other skills to do so. In psychological terms, this is choosing the 'fight' reaction to stress, compared to flight or freeze.

Drug dealing could also be status-based, giving a sense of power - having a valuable product that others require, and choosing who to sell to and who not to.

♦ *"They feel dumb," Delano-Gemzik said. "They feel frustrated, and they're using that behaviour outside of school to win back power and self-definition."* (Thompson, 2022a)

Leaving school without adequate qualifications

Individuals with dyslexia frequently struggle academically and leave school with few or no formal qualifications. This comes from the school's focus on reading, writing, and spelling, mainly in formats which are inaccessible to many, especially those with literacy difficulties or dyslexia.

Qualifications, such as GCSEs for young people, are gateway qualifications towards A Levels, BTECs (vocational courses), and college courses, and then hopefully university degrees or apprenticeships leading to professional qualifications. The lack of these will mean the opportunities open to young people will be dramatically reduced.

When one talks about gateways to crime, lack of qualifications is one such risk factor (Prison Reform Trust, 2008):

♦ *"I have been on benefits ever since I was a little kid. I filled in a form for McDonald's, but I never got an interview. I painted, but that was an illegal business. I looked for a job, so I didn't get into trouble on the outside. I was on income support, but I wanted a job, but the careers advisor said I was incapable of working. They gave me a test, but I couldn't do it. I used to have blackouts and they put me on Valium."* Young offender.
♦ *"I did bricklaying and gardening part-time. I was on benefits sometimes as I couldn't get a proper job because I couldn't read or spell. Then just before I got arrested, I got a job in a factory filling dolls and soft toys."* Young offender.

If all your friends at 16 years old gain 5-10 GCSE passes and either continue at school or go to college, but you only have an entry-level or a level 1 qualification in English and Maths; your choices are much reduced or are minimal. Your school may ask you to leave, as they do not offer courses that interest you, or are not at the low entry level you can access. Or as some do, suggest which courses you can do, even if they are unsuitable for

you, for the school to continue to gain government funding. It would be normal to be angry and resentful.

Were you supported with your learning difficulties? Were the courses offered at 14-16 years old relevant? Who should your anger and resentment be targeted at? The teachers, the school, or society and their rules? How do you deal with your anger, do you set fire to the school, or let down your teacher's tyres?

Resentment and anger are some of the simmering reasons why some young people turn to crime, to rebel against a society they perceive has excluded them. The professionals have let them down, so burning down their school buildings could be perceived as valid retribution, and this can inevitably lead to a criminal record. No one cares for the reason behind the crime, it's the crime that is punished and any resulting criminal record will last a lifetime, affecting getting jobs, and applying for loans and credit cards. Sadly, teenagers and young people are naturally ego-centric, living for the moment with few thoughts about the implications.

Post-school alternatives

In the UK it is a legal requirement to continue education until a young person is 18 years old, therefore there are four main alternatives for young people at 16 years old, the age when they have completed their secondary education:

- ♦ Stay on at school and study for A Levels
- ♦ Stay on at school and study for BTECs
- ♦ Leave school and go to college to study for a range of level 1 to 3 courses
- ♦ Leave school and go into an apprenticeship to learn a trade

The above options depend on the qualifications gained at 16 years old. Some with dyslexia, diagnosed or undiagnosed, will gain enough qualifications at GCSE (5 or more grade 5-9 passes) to move onto A Levels and BTECS, finding college a more relaxed environment than school, being seen as succeeding at school, but in real terms scraping passes – so surviving, not succeeding at school. They tend to work much harder than their peers, but their results do not reflect their potential if they were allowed a scribe to record their examination (having a scribe for examinations would remove all barriers such as handwriting, spelling and grammar structure).

For young people who have not gained such entry-level qualifications, traumatised by school, the choices are much reduced, and therefore question any form of learning, due to the previous negative experience leading to school disengagement, so may leave for college, which is generally part-time, and look for alternatives (part-time jobs).
If the young person is aware of their strengths, generally in vocational subjects, as in my case, then they will choose a specialist course which embraces these skills (this author

went to art college as he was unable to study for A Levels, so his own options were very limited). Commonly the young dyslexic, generally undiagnosed, will be unaware of any strengths they have and look for alternative means to develop careers. Hanging out with their peers from the classes they were in at school, will tend to mean being surrounded with lower ability students and immersed in the activities they will be involved with, which may be around alcohol, drugs, and mischief-making to gain kicks. With too much free time, now not in full-time education, these will be unlikely to be positive role models for the young dyslexic who is struggling to make sense of their life, and what the future holds for them.

At this stage, the young dyslexic is very susceptible to mixing with gangs and peers who are highly materialistic and will crave the latest clothes and technology of their friends for status. The move towards driving age will mean that cars will become status symbols, and the need to own a nice car is perceived as the means of attracting partners for social-sexual encounters. Ownership will mean for those without a job and the means to earn, a pull towards stealing cars.

The young dyslexic will crave earning money, but without the GCSE qualifications will struggle to gain employment, for example in a fast-food chain industry (entry requirements are GCSE grade 4 in English Language, Maths, and preferably ICT).

At this point, turning to crime to earn enough to live, can be seen as a viable and sometimes only logical solution for those who may struggle to gain employment or an apprenticeship to learn a trade. Research at Doncaster Prison found in (Hewitt-Main, 2020) that 71% of inmates were unemployed before entering prison, which reflects their inability to gain employment due to poor examination grades at 16 years old.

Drifting into a life of crime

Young people tend to start with smaller crimes which may start as a dare from their peer group e.g. stealing from newsagents (National Society for the Prevention of Cruelty to Children-NSPCC, 2022). This can escalate into bigger crimes, especially when the need comes from servicing a drug addiction, or peer pressure, this can be termed as 'criminal exploitation' (NSPCC, 2022). Stealing from a parent or mugging someone to service a drug habit can become seriously dangerous, especially if a weapon is used, and this drift into crime can also be linked to a greater need for more money to feed an ever-increasing drug habit. Moving from lighter to stronger drugs, as the need to feed the habit becomes stronger and stronger, with increasing mood swings can lead to 'grievous bodily harm' (GBH) to others. This can mean their behaviour is more erratic which can cause relationship breakdowns (e.g. with family and friends), to the point parents tell young people to leave home.

The NSPCC (2022) describe how young people are recruited into crime:

- Peer pressure and wanting to fit in with their friends
- They feel respected and important
- They want to feel protected from other gangs, or bullies
- They want to make money and are promised rewards
- They want to gain status and feel powerful
- They've been excluded from school and don't feel they have a future

The NSPCC (2022) also highlight the dangers of criminal exploitation can include:

- Being subject to threats, blackmail, and violence
- Being exploited and forced to commit crimes
- Being arrested, including for crimes committed by the gang that they have not directly committed under the law of joint enterprise
- Not being able to leave or cut off ties with the gang
- Having their safety or the safety of friends and family threatened
- Risk of physical harm, rape, and sexual abuse
- Risk of emotional abuse
- Risk of severe injury or being killed
- Abusing drugs, alcohol, and other substances
- Long-term impact on education and employment options.

The move to stealing cars increases the risk level and the enjoyment of the crime, and lastly also increases the amount earned from each crime. However, such visual crimes are the ones with a higher rate of arrest, conviction, and gaining custodial (prison) sentences.

Where the young person does not have a job, whilst criminal activity may feed a drug habit, it is also commonly needed to pay for rent, food, and their social life. The need for more and more money will drive young people to go bigger and bigger in their crimes, commonly involving guns and knives. The higher monetary gains from crime can be addictive, like a drug. Likewise, the high from betting can also drive young people to steal to feed borrowing commitments, which becomes an addiction. It's a never-ending spiral, dangerous, with an increased risk of criminality.

The status gained from criminal vocational endeavours can drive the adrenaline rush to continue the crimes, proving they have self-worth and can gain money through robbery, and purchase the items that they feel they should have in life, reflected in the social media they view. Each crime they are not arrested for develops a sense that they will never get caught, feeding the lowering of their inhibitions to greater criminal endeavours.

From the author's interview with fellow dyslexic Jackie Hewitt-Main, the founder of the innovative and successful Cascade Project at a Doncaster Prison (there is more than one), resulting in the 'Dyslexia Behind Bars' report (Hewitt-Main, 2020). She notes from her work with prisoners a common theme merged:

♦ *"It is much easier robbing a supermarket than asking for help to read the labels, therefore crime is seen by some to be the easier way out to gain the same result. The humiliation felt asking for help to read food labels is huge in those with reading and writing difficulties."*

A first offence rarely leads to arrest, unless you are caught committing a very serious offence, such as murder. Speaking with a career criminal, they began stealing at a very young age, 6-7 years old, after being sent out to shops to buy items for their parents and stealing a chocolate bar when the shopkeeper wasn't looking. At 11 years old they were sent to a home run by social services rather than being sent to a youth offenders' prison for breaking crimes but subsequently went to a youth offenders' unit after further crimes which included stealing cars and armed robbery. In the UK, 10 years old is the age of criminal responsibility, so a 5-9 year old child can not be arrested and charged with crimes.

♦ *"When dyslexics experience lack of appropriate support from their early years, this can lead to poor reading, writing and number skills, low self-esteem, frustration, anger, truanting or exclusion from school and poor employment prospects.... all of which play their part in the climate of offending."* Magistrate and Dyslexia expert (Thompson, 2022a)

DISCUSSION

As part of the wider study, several questions were posed:

- ♦ Why are there so many in prison with dyslexia/neurodivergence?
- ♦ Why would someone with dyslexia/neurodivergence get involved in crime?
- ♦ Are all dyslexics/neurodivergent individuals in prison guilty?
- ♦ Why would a person take a guilty plea if they are innocent?
- ♦ Would a dyslexic/neurodivergent person fare better being heard at a trial?
- ♦ Mitigating circumstances (also known as extenuating circumstances), what are these?
- ♦ Should dyslexia/neurodivergence be taken seriously as a mitigating circumstance?
- ♦ If someone with undiagnosed dyslexia/neurodivergence commits a crime, shouldn't they be sentenced?
- ♦ What would be a suitable alternative to a prison sentence for someone with unidentified learning difficulties/dyslexia/neurodivergence?

Why are there so many in prison with dyslexia/neurodivergence?

Most of those with dyslexia/neurodivergence did not know they were before they entered prison, which in part answers the question, so if they were unaware they were dyslexic/neurodivergent, then the police and criminal justice system also were unaware. In addition, it would also suggest that they were not assessed at school and given the help they needed to avoid choosing offending. So, leaving school with no paper qualifications and having no route to vocational training for non-criminal employment, is termed the 'school to prison' pathway.

Why would someone with dyslexia/neurodivergence get involved in crime?

Research suggests that many young people with learning difficulties (not just dyslexia) are not screened during their 11 years of mandatory education (5-16 years old) and therefore struggle to access learning. This means they are likely put in the lowest ability classes and mix with delinquent children who are more likely to get involved with crime. These place undiagnosed, struggling, easily influenced young persons in a vulnerable position and likely to be sucked into crime through association. Criminal gangs will judge them on what they 'can' do rather than what they 'can't', as experienced in school. This reinforces the idea that society is against them, and they are rejected from mainstream education, employment, and society.

What types of crime do those with dyslexia/neurodivergence people get involved with?

It is suggested that those with dyslexia and other learning difficulties are drawn towards crimes that do not require literacy, however, there are few research projects to support such a hypothesis.

In one of the few UK studies, noted in Furlong (2018), the Healthcare Commission and HM Inspectorate of Probation (2006) compared the self-reported anti-social behaviour of young people with learning disabilities to non-learning-disabled adolescents. They found that young people with learning disabilities reported significantly higher numbers of anti-social behaviours, which included stealing valuables, stealing in the street, property damage, bullying, use of weapons and fire setting. Consequently, this resulted in a higher proportion of adolescents with learning disabilities reporting that they had been involved with the police. This had a relatively small sample of 98 participants, using self-reported questionnaires, so results should be viewed with caution.

Are all dyslexics/neurodivergent individuals in prison guilty?

A very good question, and the evidence regarding 'fair trial' and especially 'plea bargains' may suggest that many in prison with dyslexia/neurodivergence may have

been misled into accepting a guilty plea, and therefore did not gain a fair trial.

There is also evidence to suggest that at the point of arrest and subsequently questioned, their learning difficulties were unknown, and therefore they were not afforded the support needed, and due to their difficulties e.g. being unable to account for themselves on specific days and times, they were deemed to be guilty by default and offered a statement to sign that they were unable to read and understand. They were signing away their innocent plea, without fully understanding their rights.

Her Majesty's Inspectorate of Prisons and OFSTED (2022) suggests that over 50% of the prison population have a reading age of below 11-years-old (10-years-old is the age of being capable/liable for one's actions in the UK) so it could be argued they were unable to read any statement given to them and would struggle to understand any legal documents presented to them. Therefore, failing the Pritchard Test of competence, the fitness to stand trial, but were still charged for crimes (McConnell & Talbot, 2013).

Why would a person take a guilty plea if they are innocent?

Fair Trials (2022) argue that due to the shortage of legal aid lawyers (paid for by the state) and many arrested only having 20-30 minutes of legal representation before facing a judge, and they are told that apart from having a reduced sentence (by a third) if they plead guilty, their prison term will start on day one. These are strong incentives being provided to accept a guilty plea even if a person is innocent.

Once a person has signed a guilty statement after being questioned, without the support required of someone with learning difficulties, it is much harder to go against such a statement.

Accepting a guilty plea can be argued to be:

- ♦ Cheaper where a person is not entitled to legal aid
- ♦ Easier for the family (not going through a long-drawn-out court case)
- ♦ Allowing their sentence can start on day one

It is said that being on remand, which is waiting for a court case, you have fewer privileges in prison, it is harder to start any prison jobs or training, and frequent changes in prison are emotionally very hard. Research suggests many with autism/ADHD and dyslexia plead guilty when they are not, Helm (2021) asked 90 legal professionals if they felt their clients were guilty, as 73% of defendants pled guilty in the Crown Court from January to March 2021, and 75.1% pleaded guilty in 2020. The results from the study indicated a wide variation, from less than 1% to 20% pleaded guilty when the legal professionals perceived were not. This may have been from misplaced pressure from parents and other legal professionals. Helm (2021) noted:

- ♦ *"I think that they are more likely to plead guilty to avoid giving evidence at trial."*
- ♦ *"It is difficult when dealing with vulnerable young people and often they are accompanied by a parent or guardian who will have more input in any decision they make."*
- ♦ *"Clients with ADHD or Autism need very careful advice because the nature of the disorders means that clients can be both entrenched and very suggestible. In my experience pleas have been mixed."*
- ♦ *"Often they enter early guilty pleas and have not been properly assessed and given adequate measures to ensure effective participation."*

The Human Right Commission (2022) found in their report of 130 research participants:

- ♦ 49% of professionals responding to our survey in England and Wales felt that disabled defendants would be more likely to plead guilty if they did not receive adjustments
- ♦ 50% said that without adjustments, disabled defendants would be less likely to be granted bail

Would a dyslexic/neurodivergent person fare better by going to trial?

At present learning difficulties are not perceived to be 'mitigating circumstances', therefore they will not gain the special considerations they need due to their difficulties (Day, 2022).

It is also argued that due to learning difficulties, many with dyslexia/neurodivergence struggle would struggle understanding a complex court situation, and their disengagement is viewed poorly by judges, as detailed in this book.

The lack of understanding in court, of learning difficulties, along with such individuals avoiding disclosing they are unable to read and write to a court, due to fear and embarrassment, means they would be unlikely to gain a fair trial, and so gain a longer sentence.

If there was screening at the point of arrest, and support during the process and into the courtroom, then I believe they would fare better going to trial.

Mitigating circumstances (also known as extenuating circumstances), what are these?

These may include (Cohen and Lipsett, 1991; Redmond and Rice, 1998):

- ♦ More provocation than normally expected
- ♦ Mental illness or disability (understood to be a physical disability)

- ♦ Youth or age, where it affects the responsibility of the individual defendant
- ♦ The fact that the offender played only a minor role in the offence
- ♦ The defendant has no prior or significant criminal record
- ♦ The defendant played a minor role in the crime
- ♦ The defendant recognised the error of their ways
- ♦ The defendant making restitution to the victim of their crime
- ♦ The defendant acting out of necessity
- ♦ The defendant has a difficult personal history
- ♦ The defendant struggling with a drug or alcohol addiction

It is argued that dyslexia, like those with neurodivergence is a 'learning difficulty' and whilst is covered under equality legislation, they are not commonly seen as 'disabled' (Gramann, 2022), stereotypically seen as having a physical disability. Dyslexia is one of many conditions which are covered under the 'hidden disability' umbrella. The United Nations (2011) concludes there are more individuals with a hidden disability than those with a visual (seen) disability, and there is a challenge for society to recognise those with an invisible disability/difficulty.

Should dyslexia/neurodivergence be taken seriously as a mitigating circumstance?

The 2019 United Nations Convention on the Rights of the Child (UNISEF, 2019) argue that children with dyslexia/neurodiversity *"should not be in the child justice system at all"*, so should only go to prison as a last resort, and that support in the community (e.g. Community Orders) therefore educationally based, is a more suitable provision for those who have committed a crime due to disabilities.

This recognises the lack of educational opportunities and the lack of screening in both mainstream education (schools) and the youth justice system. Supporting this is the evidence that of those referred to Pupil Referral Units (PRU), in one 2017-18 study (Gormley, 2022), 81% could be newly diagnosed with a SEND, suggesting that schools had missed their core SEND needs and only treated their manifestations of frustration (their behaviour) and excluded them as a result. Evidence also suggests schools know that if a child may have a SEND, it would be harder to permanently exclude, so will deliberately not assess for such needs.

The UK's Office of the Children's Commissioner (Gormley, 2022) recommended that The Sentencing Council for England and Wales should ensure that sentencing guidelines take account of the relevance of neuro-disabilities to criminal behaviour and the efficacy of potential sentences and interventions, including the potential impact of difficulties with reading, processing and memory, maturity of judgement, impulsivity, and an understanding of the perspectives of others. More recent evidence suggests this recommendation has not been put into action.

Can those with dyslexia/neurodivergence meet the conditions of their sentence, to be released?

To gain release from prison, inmates must evidence that they have been rehabilitated and have undertaken various educational or training courses whilst in prison. Most prison courses are Level 1 and above, requiring entry requirements of the ability to read and write. As evidence also suggests that over 50% of the prison population have reading ages below 11 years old, it seems clear that most with dyslexia will struggle to meet the conditions of their probation board. This has resulted in many remaining in prison beyond the terms of their sentences and is in a state of flux (with no movement possible). Only through the intervention of The Shannon Trust, a voluntary organisation, can they have any chance of gaining release. Thus, most of the courses available can be argued to be both inappropriate and discriminatory for most inmates.

♦ *"Having had multiple failed attempts to satisfy the criteria for his release, Charlie [a person in their study] struggled to comply with the progression requirements for those serving long-term sentences."* Prisoner (Gormley, 2022)

If someone with undiagnosed dyslexia (or neurodivergent) commits a crime, shouldn't they be sentenced?

The simplistic and logical answer is 'yes', if they committed a crime they should be tried for their crimes. However, 'mitigating circumstances' could argue that they had experienced systematic failure (systemic and institutionalised discrimination) throughout their life, in both primary and secondary education where their needs had not been identified and supported:

♦ Schools had seen their poor behaviour and understood it as purely misbehaviour, and not a manifestation of continual school failure or an underlying learning difficulty.

♦ Dyslexia diagnosis tends to come from educational psychologists, but schools see dyslexia as a lower priority than autism and ADHD, so will tend to not diagnose dyslexia.

♦ The lack of specialist dyslexia/neurodivergence advisers from local educational authorities means there is a lack of specialist knowledge available to schools.

♦ Numerous schools dismissed any lack of academic progress as laziness.

♦ Any increased misbehaviour which probably led to them being excluded and sent to an alternative provision/pupil referral unit at a young age was due to increased frustration of being made to attend a school where they lacked the skills and abilities to access the curriculum, and help was unavailable.

♦ Their frustration and being grouped with lower-ability peers in school, meant they mixed with the same crowd outside of school, saw them as a more

    suitable family unit than their own, and followed them into first petty and then more serious crimes, which ultimately led them to now being arrested for a crime.

♦   Alternative provision/pupil referral unit failed to identify the root cause of the misbehaviour, so placed them, as vulnerable and easily influenced, in a unit with delinquent young people, so the jump into criminal activity could be inevitable.

It could be argued that such undiagnosed dyslexic/neurodivergent individuals were let down and failed by schools, and after 12 years of mandatory education left without the skills and abilities to read, write, and spell. Also having few or no paper qualifications to their name, they are unable to join a skills-based college course to gain career training, for employment that would be high enough paid to satisfy their living needs.

Judges can use 'Diversion', which means sentencing an individual to have a 'Community Order' which can be linked to completing both educational and training courses. In the case of those with dyslexia, especially those unidentified or identified but not helped at school, this could be argued to be a more appropriate provision, which will lessen the chance of reoffending, the aim of rehabilitation, and gain the skills for possible future employment. It can also mean the individual can avoid gaining a criminal record which may affect future career choice/employment prospects.

What would be a suitable alternative to a prison sentence for someone with unidentified learning difficulties/dyslexia?

The Crown Prosecution Service (CPS) has a range of options for those who have committed crimes but are unsuitable for prison, these can include 'Community Orders' allowing them to be linked to (National Offender Management, 2014):

♦   Unpaid work
♦   Activity (including education, training) e.g. to learn literacy/numeracy or gain a vocational skill
♦   Programme (group or individual programmes tackling the causes of the offending behaviour)
♦   Prohibited activity
♦   Curfew
♦   Exclusion (from a specified area or areas)
♦   Residence at a specified place
♦   Mental health treatment
♦   Drug rehabilitation
♦   Alcohol treatment
♦   Supervision (involving regular appointments with a probation officer)
♦   Attendance centre (for 18 to 24-year-olds; addressing offending behaviour in a group setting)

It is argued that a 'Community Order' would provide the support needed for an individual to gain the assessment, skills, and abilities to choose a career away from crime and to gain a suitable and fulfilling career which would allow them to succeed in life.

Boughey (2022) draws on the need for young neurodiverse people to help avoid them being sent to prison suggests the use of Secure Children's Housing (SCH's), which employs staff who have been trained for the educational and therapeutic provision of neuro-diverse young people (The Howard League for Penal Reform, 2017). Secure Housing/schools would provide appropriate rehabilitation of young offenders with learning difficulties and provide them with the education that they may otherwise miss out on if placed in a Young Offenders' Institution (Bateman, 2016). These schools would also ensure that disabled young people are supported properly in a setting where lessons are compulsory and non-avoidable (Fitzpatrick, 2014).

As Haines et. al. (2012) notes *"It is essential that young people receive an education, to deter them from criminality, allow them to build their creativity, and expose them to ideas that might generate a career path"* (Capriola, 2019). Young people placed into an SCH would be living in a secure facility that mirrors the environment of a school, and therefore would reduce the damaging effects of custody. Boughey (2022) notes the Taylor Review (2016) indicating that staff working within the YJS did not have the sufficient skills required to support the most vulnerable population of young people.

Boughey (2022) concludes that *"young people with neuro-divergent needs should be in safe environments, where they receive education to give them the best start in life and deter them from criminality. Here, they can be encouraged to express themselves with the support of expertly trained staff, family, and the community".* A view shared by the Youth Justice Board (2019).

The options are there, but first, a change needs to take place at the time of any arrest to identify learning difficulties, until this happens such individuals will:

- ♦ Not be afforded the help they need, due to a lack of screening before being questioned
- ♦ Will likely sign a witness statement that they cannot understand or agree with
- ♦ Not be afforded the legal support needed, and protections they have a right to gain
- ♦ Will likely accept a guilty plea and end up in prison, where they will again not be screened and supported for their learning difficulties

The 'school to prison' pathway would be complete! What is needed is to break this link and create a positive pathway.

CONCLUSIONS

This paper does not advocate that crimes from those with dyslexia/neurodivergence should be ignored, but if arrested, such individuals should be screened for learning difficulties and supported when arrested and questioned.

Poor educational advantage should be considered as mitigating circumstances, so if guilty of the accused crimes, are given suitable educational support, ideally as a community order if sentenced, or if needed to serve in prison, to undertake suitable entry-level/level 1 courses in prison.

If already in prison, have they been screened for learning disabilities? If not this needs to urgently take place, and if they do have learning difficulties, possible miscarriages of justice should be investigated. Could they pass the Pritchard test e.g. could they read the witness statement they signed? Were they able to engage in the process? If they were not afforded the protections under the Human Rights and UK Equality legislation, then their sentences should be questioned (Equality and Human Rights Commission, 2022).

If already in prison with a long sentence, and have been institutionalised, and their sentences are quashed, they should be moved to suitable secure accommodation and rehabilitated to be released to the community.

This paper discusses hard-hitting evidence that those with dyslexia/neurodivergence have commonly been mistreated during their 12 years of mandatory education (6-18 years old), time in alternative education, time in the criminal justice system, and finally in prisons. This mistreatment could be classed as discriminatory, so there is an urgent need to both affect the outcomes of those currently residing in prisons and more importantly, to avoid further generations feeling that crime is the only path open to them e.g. that employment is beyond their ability and feeling helplessness. So urgent action is needed, with screening in the first years of primary school to identify those with learning barriers, before they become demotivated and develop learned helpless at school, as this is the first point of the 'school to prison pathway'.

Dr Maggie Atkinson, The Children's Commissioner for England (Office of the Children's Commissioner, 2012) remarked:

- ♦ *During the investigation, we became concerned about the possibility that considerable numbers of young people in custody may have undiagnosed neurodevelopmental disabilities which contributed to the behaviours that led them to offend.*

- ♦ *The failure to identify such disorders is a tragedy in many ways. It directly, certainly negatively, affects the lives of the victims of these children's*

> *crimes, of the children themselves, their families, and the services seeking to change offenders' lives for the better, and wider society.*

> ♦ *The key message in this report is that we must identify and treat these children's conditions at an early stage. Doing so is, surely, the most effective way to avoid the huge individual, social and financial costs of the criminal behaviours they may otherwise continue to display in the longer term.*

Dr Maggie Atkinson goes on to note (Office of the Children's Commissioner, 2012):

> ♦ *Though these children may know the difference between right and wrong, they may not understand the consequences of their violent or disruptive actions, the processes they then go through in courts or custody, or the means to address their behaviours so they can avoid offending again in the future.*

> ♦ *The assessment, recognition, and treatment of neurodevelopmental disorders in children when they are still very young would have significant benefits, allowing the affected children to be diverted from a potential trajectory into the criminal justice system.*

> ♦ *Our studies focused on the range of neurodevelopmental disorders, they consistently highlight unmet needs due to a lack of identification and difficulties accessing appropriate support and intervention.*

As one prisoner noted:

> ♦ *"If I'd had the treatment and education I have received here before I came to prison, I would never have ended up here at all".*

Dr Maggie Atkinson agrees that there should be a move of neurodivergent young people out of the youth justice system (Office of the Children's Commissioner, 2012):

> ♦ *The Youth Justice Board, Department of Health and local youth justice agencies should ensure that young people with neurodevelopmental disorders are, wherever possible, diverted out of the youth justice system without criminalisation. Referral should instead be made to specialist services, able to manage risks and meet needs to make future savings through investment in early intervention.*

Lord Bradley concluded his review (Furlong, 2018) by stating:

♦   *"The first step to the effective management of offenders is the existence of good early identification and assessment of problems, which can inform how and where they are most appropriately treated"*

Boughey (2022) argues the need to move neurodiverse young people out of any 'school to prison pathway', and into Secure Children's Housing (SCH's) to receive targeted education to give them the best start in life and deter them from criminality. It is argued to be the best way to provide them with the education and therapeutic support (e.g. CAHMS diagnosis and interventions) that they may otherwise miss out on if placed in a Young Offenders' Institution (Bateman, 2016) or supported by Youth Offending Teams.

A joint inspection of the treatment of offenders with learning disabilities (Hughes, 2015) found that 58% of detainees with learning disabilities did not have their learning disability identified whilst in the care of the Crown Prosecution Service (CPS). This suggests that there is a problem with how the police identify those with learning disabilities. The lack of an appropriate screening process reinforces the suggestion that efficient identification of learning disabilities should be an urgent priority, particularly within the initial stages of The Criminal Justice System (Day, 2022; Gramann, 2022).

It should also be highlighted that educational provision in prisons is grave (Prisoner Learning Alliance, 2022), and in the last 22 inspections by OFSTED only one prison was rated 'good', and the incentives to learn are also of significant concern. All prisoners are paid for education and work, however, whilst prisoners are paid typically £8.55 a week to learn, they are offered up to £22.50 a week to work (Prisoner Learning Alliance, 2022). Most prisoners tend to choose work roles over education as this will allow them to supplement the food in prisons and keep in phone contact with family and friends. This needs to change, and each prison governor sets these rates, so can be changed at a local level without government guidance.

Charlie Taylor, The Chief Inspectors of UK Prisons (His Majesty's Inspectorate of Prisons, 2023) in a Blog states that:

♦   HMI Prisons assesses the progress of the prison against four areas – safety, respect, purposeful activity and rehabilitation and release planning.
♦   Education in prison has two important functions that ultimately help the establishment and the public to be safer. Prison should be an opportunity for prisoners to spend their time productively and to acquire the skills they need to go on to lead successful lives – it should give them the qualifications and the sense of achievement that will help them to behave both in jail and in the community. Education is a fundamental part of successful rehabilitation and yet it continues to be nowhere near good enough.

♦ *"[prisoners] often tell me that by age 11 they never really attended school, either because they began to play truant or because they were expelled."*

The Chief Inspectors of UK Prisons (His Majesty's Inspectorate of Prisons, 2023) believes there are four main reasons for poor educational provision in UK prisons, which of course are closely related:

♦ Education is not a priority in prisons – grading for safety and respect rate more highly than 'purposeful activity' according to most governors. This reflects the priorities of a prison service that focuses on safety and security above, and often to the exclusion of, other areas of prison life.

♦ Prisoners don't attend the classes that are on offer – most classes inspected were not full, explained by staff will prioritise getting prisoners to essential work such as kitchens, waste management or the staff canteen over those who are signed up for education, which is often cancelled. These regime curtailments mean that both teaching staff and prisoners become demotivated by the uncertainty about who will get to education on any one day. It is noted worthy that while data governs many other aspects of prison life, it is telling that data is not collected by the centre on attendance rates in education.

♦ The curriculum is not suitable - Ofsted has repeatedly highlighted the inadequacy of the curriculum in jails. In a recent inspection of a reception prison, where prisoners rarely spent more than six months, inspectors found that many of the courses that were on offer took a year to complete. Our joint thematic with Ofsted last year on reading in prisons showed that education providers did not see it as their responsibility to teach prisoners to read – despite the staggeringly high levels of illiteracy in prisons.

♦ There is no clear accountability for the quality of education – education in prisons is commissioned by the Ministry of Justice, and to make any change even minor, each prison must apply for the Ministry of Justice to amend the contracts given to each prison. Accountability comes mainly through Ofsted inspections and while these consistently raise similar concerns, there are no other overseeing bodies or angry parents to hold providers and governors to account on a more regular basis. There are no league tables as with schools.

♦ *"For many years inspectorates have highlighted poor standards in prison education, but since the pandemic they have never been worse than they are now".*

I think any last words should come from a 2022 statement by Amanda Spielman, Her Majesty's Chief Inspector, Head of OFSTED, the UK body that inspects schools, colleges, and prisons, looking at 'Prison education: a review of reading education in prisons' (Her Majesty's Inspectorate of Prisons and OFSTED, 2022):

♦   *"We have been particularly worried about the number of prisoners who are simply unable to read. Reading is a fundamental life skill.*

♦   *We know from our school inspections that children who struggle to read fall behind quickly and become disillusioned with education, and that this sometimes leads to issues with behaviour and exclusions.*

♦   *It is the same sad story with prisoners. Lack of access to education maintains inequality and seriously curtails a prisoner's life chances, whereas improving reading skills can, of itself, improve employability and give access to other educational opportunities that will also improve the prisoner's prospects after prison."*

REFERENCES

Adams, B. (1999). *A spell on the inside: Dyslexia*. 23rd July 1999. TES. Retrieved 7th August 2022. https://www.tes.com/magazine/archive/spell-insidedyslexia

Alexander-Passe, N. (2015). *Dyslexia and Mental Health: Helping people identify destructive behaviours and find positive ways to cope*. Jessica Kingsley Publishers

Alexander-Passe, N. (2023). *Dyslexia, Neurodiversity, and Crime: investigating the school to prison pipeline*. Dio Press. New York

Alexander-Passe, N. (2024). *ADHD, and Crime: investigating the school to prison pipeline*. Dio Press. New York.

Ankney, D. (2019). Correlation between Dyslexia and Criminal Behaviour; First Step Act to Require Screening, Treatment. *Prison Legal News.* August, 2019, page 30

Arad Consulting, & Evans, J. (2009). *Analysis of support for young people with special educational needs (SEN) in the youth justice sector in Wales*. July 2009. Department for Children, Education, Lifelong Learning and Skills, Welsh Government.

Arnez, J., & Condry, R. (2021). Criminological perspectives on school exclusion and youth offending. *Emotional & Behavioural Difficulties.* https://doi.org/10.1080/13632752.2021.1905233

Barrett, B., Byford, S., Chitsabesan, P., & Kenning, C. (2006). 'Mental Health Provision for Young Offenders: Service Use and Cost', *The British Journal of Psychiatry*, *188,* 541-546

Bateman, T. (2016). '*The State of Youth Custody.'* [online] National Association for Youth Justice.pg 4-12. Available at: https://thenayj.org.uk/wp–content/uploads/2016/10/NAYJBriefing–State–of–Youth–Custody–2016.pdf Accessed 16 December 2021

Becker, H. (1963). Outsiders: Studies in the Sociology of Deviance. New York: Free Press.

Berridge, D., Brodie, I., Pitts, J., Porteous, D., & Tarling, R. (2001). *'The independent effects of*

permanent exclusion from school on the offending careers of young people' London. Home Office.

Boughey, A. (2022). Under-protected and over-regulated: Avoiding custody for young people with neurodiverse needs. *Youth & Policy.* 11th November 2022. Retrieved 12th December 2022. https://www.youthandpolicy.org/articles/under-protected-and-over-regulated/

Bryan, K. (2004). Preliminary study of the prevalence of speech and language difficulties in young offenders. International *Journal of Language and Communication Disorders*, 39, 391400.

Capriola, P. (2019) *How to Explain the Importance of Education to a Child. Strategies for Parents.* [online] Available at https://strategiesforparents.com/how–to–explain–theimportance–of–education–to–a–child/. Accessed 16 December 2021.

Case, S., & Hazel, N. (2020). Child first, offender second: A progressive model for education in custody. *International Journal of Educational Development, 77, Article 102244.*

Chitsabesan, P., Kroll, L., Bailey, S., Kenning, C., Sneider, S., MacDonald, W., Theodosiou, L. (2006). Mental health needs of young offenders in custody and in the community. *Br J Psychiatry.* 2006 Jun;188:534-40. doi: 10.1192/bjp.bp.105.010116. PMID: 16738343.

Cohen, N. J., & Lipsett. L. (1991). Recognized and unrecognized language impairment in psychologically disturbed children, child symptomatology, maternal depression and family dysfunction-preliminary report. *Canadian Journal of Behavioural Science-Revue Canadienne Des Sciences Du Comportement,* 23, 376-389.

Criminal Justice. (2022). *Education and Crime.* Retrieved 9th August 2022. https://criminal-justice.iresearchnet.com/crime/education-and-crime/4/

Day, A. M. (2022). Disabling and criminalising systems? Understanding the experiences and challenges facing incarcerated, neurodivergent children in the education and youth justice systems in England, Forensic Science International: *Mind and Law,* Volume 3.

Department of Education. (2024). *Suspensions and permanent exclusions in England, Academic year 2022/23.* 18 July 2024. GOV.UK.

Dishion, T. J., & Tipsord, J. M. (2011). Peer contagion in child and adolescent social and emotional development. *Annual Review of Psychology*, *62*, 189-214.

Dishion, T. J., Andrews, D. W. (1995). Preventing escalation in problem behaviours with high-risk young adolescents: Immediate and 1-year outcomes. *Journal of Consulting and Clinical Psychology, 63*, 538-548.

Equality and Human Rights Commission. (2022). *Inclusive justice: a system designed for all. Findings and recommendations. Retrieved* 22 October 2022. https://www.equalityhumanrights.com/en/publication-download/inclusive-justice-system-designed-all

Fair Trials. (2022). *Young minds, big decisions fairtrials.org Fairness, equality, justice: An insight into the experiences of young adults pleading guilty to crimes in England & Wales.* Retrieved 22nd October 2022. https://www.fairtrials.org/app/uploads/2022/10/Young-minds-big-decisions.pdf

Fitzpatrick, K. (2014) *'Achieving justice for young people in care and care-leavers' Howard League What is Justice?* Working Papers 14/2014 (online) Available at https://howardleague.org/wp–content/uploads/2016/04/HLWP_14_2014.pdf. Accessed 3 December 2021

Ford J. D., Chapman J. F., Pearson G., Borum R., Wolpaw J. M. (2008). MAYSI-2 factor structure, reliability, and predictive validity in juvenile detention. *Journal of Psychopathology and Behavioral Assessment, 30*, 87-99.

Frothingham, M. B. (2021). *Fight, Flight, Freeze, or Fawn: What This Response Means.* Oct 06 2021 Retrieved 9th November 2022. https://www.simplypsychology.org/fight-flight-freeze-

fawn.html

Furlong, F. (2018). *Exploring the perceptions of criminal justice personnel towards young people with learning difficulties and the subsequent potential for educational psychology involvement within the justice system.* 14 May 2018. PhD thesis, Cardiff University. Retrieved 9th November 2022. https://orca.cardiff.ac.uk/id/eprint/120943/

Gill, K., Quilter-Pinner, H., & Swift, D. (2017). *Making the difference: Breaking the link between school exclusion and social exclusion.* London: Institute for Public Policy Research.

Gormley, C. (2022) The Hidden Harms of Prison Life for People with Learning Disabilities, *The British Journal of Criminology, 62*, 2, March 2022, Pages 261–278, https://doi.org/10.1093/bjc/azab061

Gramann, J. (2022). *How does sentencing take into account an offender's disabilities?* Retrieved 22nd October 2022. https://www.sentencingcouncil.org.uk/blog/post/how-does-sentencing-take-into-account-an-offenders-disabilities/

Haines, K., Case, S., Smith, R., Joe Laidler, K., Hughes, N., Webster, C., Goddard, T., Deakin, J., Johns, D., Richards, K., & Gray, P., (2012). Young people and Crime: In the Moment. *Youth Justice, 21* (3), pp.275-298.

Harris, R. MP. (2012). *Dyslexia in Prisons.* House of Commons. Volume 553: debated on Wednesday 21 November 2012. Hansard. https://hansard.parliament.uk/commons/2012-11-21/debates/12112168000001/Dyslexia(Prisons)

Healthcare Commission and HM Inspectorate of Probation. (2006). *Let's Talk About It: A Review of Healthcare in the Community for Young People Who Offend,* London: Healthcare Commission and HMI of Probation (http://www.healthcarecommission.org.uk/_db/_documents/YOTs_report.pdf)

Helm, R. (2021). *Incentivized Legal Admissions in Children Part 2: Guilty Pleas.* Retrieved 22nd October 2022. https://evidencebasedjustice.exeter.ac.uk/wp-content/uploads/2021/09/ChildGuiltyPleas_FullReport.pdf

Her Majesty's Inspectorate of Prisons and OFSTED. (2022). *Prison education: a review of reading education in prisons.* Research and analysis. Published 22 March 2022. Retrieved 8th August 2022. https://www.gov.uk/government/publications/prison-education-a-review-of-reading-education-in-prisons/prison-education-a-review-of-reading-education-in-prisons

Her Majesty's Prison and Probation Service and Ministry of Justice. (2022). *Prisons in England and Wales.* Retrieved 29th August 2022. https://www.gov.uk/government/collections/prisons-in-england-and-wales

Hewitt-Main, J. (2020). *Dyslexia Behind Bars II: The Final Report of the Co-Production Teaching, Mentoring & Coaching within Doncaster Prison and Through the Gate into the Community – over 7 years* (2013 – 2020).

His Majesty's Inspectorate of Prisons. (2023). *Chief Inspector's blog: what's going wrong with education in prisons?* Retrieved 30th January 2023. https://www.justiceinspectorates.gov.uk/hmiprisons/chief-inspectors-blog/chief-inspectors-blog-whats-going-wrong-with-education-in-prisons/

Hopkins, T., Clegg, J., & Stackhouse, J. (2016). Young offenders' perspectives on their literacy and communication skills. *International Journal of Language & Communication Disorders,* Jan;51 (1):95-109. Retrieved 9th August 2022. http://www.open-access.bcu.ac.uk/540/1/540.pdf

House of Commons Education Committee. (2019). *Forgotten children: alternative provision and the scandal of ever-increasing exclusions* Fifth Report of Session 2017–19 Report, together with formal minutes relating to the report. Retrieved 22nd October 2022. https://publications.parliament.uk/pa/cm201719/cmselect/cmeduc/342/342.pdf

Hughes, N. (2015). *Neurodisability in the youth justice system: recognising and responding to the criminalisation of neurodevelopmental impairment.* Retrieved 9th November 2022. https://howardleague.org/wp-content/uploads/2016/04/HLWP_17_2015.pdf

Hughes, N., & Peirse-O'Byrne, K. (2016). Disabled Inside: Neurodevelopmental impairments among young people in custody. *Prison Service Journal.* https://www.crimeandjustice.org.uk/sites/crimeandjustice.org.uk/files/PSJ%20226%20July%202016.pdf

Jameson, M. (2020). Equality, the law, and dyslexia: your rights. *Inside Time.* 2nd November 2020. Retrieved 29th August 2022. https://insidetime.org/equality-the-law-and-dyslexia-your-rights/

Light, J., & Dishion, T. J. (2007). Early adolescent antisocial behaviour and peer rejection: A dynamic test of a developmental process. *New directions for child and adolescent development*, 118, 77-90.

Little, W. (2022). *Chapter 7. Deviance, Crime, and Social Control.* Retrieved 12th December 2022. https://opentextbc.ca/introductiontosociology/chapter/chapter7-deviance-crime-and-social-control/

McAra, S., & McVie, L. (2010). Youth crime and justice: Key messages from the Edinburgh study of youth transitions and crime. *Criminology and Criminal Justice,* 10 (2), 179–209. https://doi.org/10.1177/1748895809360971

McConnell, P., & Talbot, J. (2013). *Mental health and learning disabilities in the criminal courts Information for magistrates, district judges and court staff.* Prison Reform Trust and Rethink Mental Illness. Retrieved 29th August 2022. file:///C:/Users/neilp/Downloads/rmi_prt_mhldcc_sept2013.pdf

National Offender Management. (2014). *Supporting Community Order Treatment Requirements.* February 2014. Retrieved 16/11/22. Servicehttps://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/426676/Supporting_CO_Treatment_Reqs.pdf

National Society for the Prevention of Cruelty to Children. (2022). *Criminal exploitation and gangs.* National Society for the Prevention of Cruelty to Children. Retrieved 9th November 2022. https://www.nspcc.org.uk/what-is-child-abuse/types-of-abuse/gangs-criminal-exploitation/#recruited

Office for National Statistics. (2018). *The nature of violent crime in England and Wales: year ending March 2018*. Retrieved 9th August 2022.

Office for Standards in Education, Children's Services and Skills. (2022). *Annual Report 2021/22: education, children's services, and skills.* Retrieved 20th December 2022. https://www.gov.uk/government/publications/ofsted-annual-report-202122-education-childrens-services-and-skills

Office of the Children's Commissioner. (2012). *Nobody made the connection: The prevalence of neurodisability in young people who offend.* October 2012. Retrieved 22nd October 2022. https://www.childrenscommissioner.gov.uk/wp-content/uploads/2017/07/Nobody-made-the-connection.pdf

Office of the Children's Commissioner. (2013). *'Always someone else's problem'. London:* OCC.

Office of the Children's Commissioner. (2021). *Briefing: Five things you need to know about SEN in schools*. London: OCC.

Prison Reform Trust. (2008). *No One Knows: prisoners' voices.* Prison Reform Trust: London. Retrieved 2nd August 2022. http://www.prisonreformtrust.org.uk/wp-content/uploads/old_files/Documents/No%20One%20Knows%20report-2.pdf

Prison Reform Trust. (2018). *I spent 40 years being told I was stupid*. 3rd November 2018. Retrieved 2nd August 2022. https://www.prisonerseducation.org.uk/story/i-spent-40-years-

being-told-i-was-stupid-distance-learning-changed-that/

Prison Reform Trust. (2022). *George's story: from struggling with dyslexia to gaining a degree*, 2nd February 2022. Retrieved 2nd August 2022. https://www.prisonerseducation.org.uk/story/georges-story-from-struggling-with-dyslexia-to-gaining-a-degree/

Prisoner Learning Alliance. (2022a). *A change I want to see in prison education: Does education pay?* 08 December 2022. https://prisonerlearningalliance.org.uk/2022/12/a-change-i-want-to-see-in-prison-education-does-education-pay/

Prisoner Learning Alliance. (2022b). *More must be done – Ofsted's message on prison education*. 13 December 2022. Prisoner Learning Alliance. Retrieved 20th November 2024. https://prisonerlearningalliance.org.uk/2022/12/more-must-be-done-ofsteds-message-on-prison-education/

Redmond, S. M., & Rice, M. L. (1998). The socioemotional behaviors of children with SLI: Social adaptation or social deviance? *Journal of Speech, Language, and Hearing Research* 41, 688-700.

Ridley, K. (2023). *Teenager feels 'failed' by education system for not getting a dyslexia diagnosis*, ITV News. Tuesday 3 October 2023 at 7:00am. ITV News Anglia. Retrieved 20th November 2024.

Sanders, J., Liebenberg, L., & Munford, R. (2020). The impact of school exclusion on later justice system involvement: Investigating the experiences of male and female students. *Educational Review, 72*(3), 386–403. https://doi.org/10.1080/ 00131911.2018.1513909

Sanger, D., Moore-Brown, B. J., Montgomery, J., Rezac, C., & Keller, H. (2003). Female incarcerated adolescents with language problems talk about their own communication behaviours and learning. *Journal of Communication Disorders, 36*, 465-486.

Sanger, D., Scheffler, M., Drake, B., Hilgert, K., Cresswell, J.W., & Hansen, D. J. (2000). Maltreated female delinquents speak about their communication behaviours. *Communication Disorders Quarterly, 21*, 176-187.

Tanti, C., Stukas, A. A., Halloran, M. J., & Foddy, M. (2011). Social identity change: Shifts in social identity during adolescence, *Journal of Adolescence, 34*, 555-567.

Taylor, C. (2016). '*Review of the Youth Justice System in England and Wales*', [online] London: Ministry of Justice. 18- 80. Available at: Review of the Youth Justice System (publishing.service.gov.uk) Accessed 15 December 2021

The Howard League for Penal Reform. (2017). *The Carlile Inquiry 10 years on: The use of restraint, solitary confinement and strip-searching on young people* [online] Available at https://howardleague.org/wp-content/uploads/2016/06/Carlile-Inquiry-10-years-on.pdf. Accessed 16 December 2021

Thompson, E. (2022a). Reading through the lines: The correlation between literacy and incarceration. *NC Health News.* Retrieved 29th August 2022. https://www.northcarolinahealthnews.org/2022/03/21/reading-through-the-lines-the-correlation-between-literacy-and-incarceration/

Thompson, E. (2022b). The pandemic shines a light on just how many school-related infractions end with children in the juvenile justice system. *NC Health News*. Retrieved 29th August 2022. https://www.northcarolinahealthnews.org/2022/03/14/the-pandemic-shines-a-light-on-just-how-many-school-related-infractions-end-with-children-in-the-juvenile-justice-system/

Timpson, E. (2019). *Timpson review of school exclusion*. London: Department for Education.

UNICEF UK. (2019). *UN Convention on Rights of a Child (UNCRC)*. United Nations

United Nations. (2011). *World report on disability*. Retrieved 22nd October 2022. 14 December 2011. https://www.who.int/publications/i/item/9789241564182

Youth Justice Board (2019). '*Standards For Young people In The Youth Justice System 2019.*' [online] London: Ministry of Justice, p.6. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data / file/780504/Standards_for_young people_in_youth_justice_services_2019.doc.pdf [Accessed 16 December 2021].

DYSLEXIA, NEURODIVERSITY, AND CRIME

Investigating the 'school to prison pipeline'

Dr. Neil Alexander-Passe

www.diopress.com/dyslexia-neurodiversity-and-crime
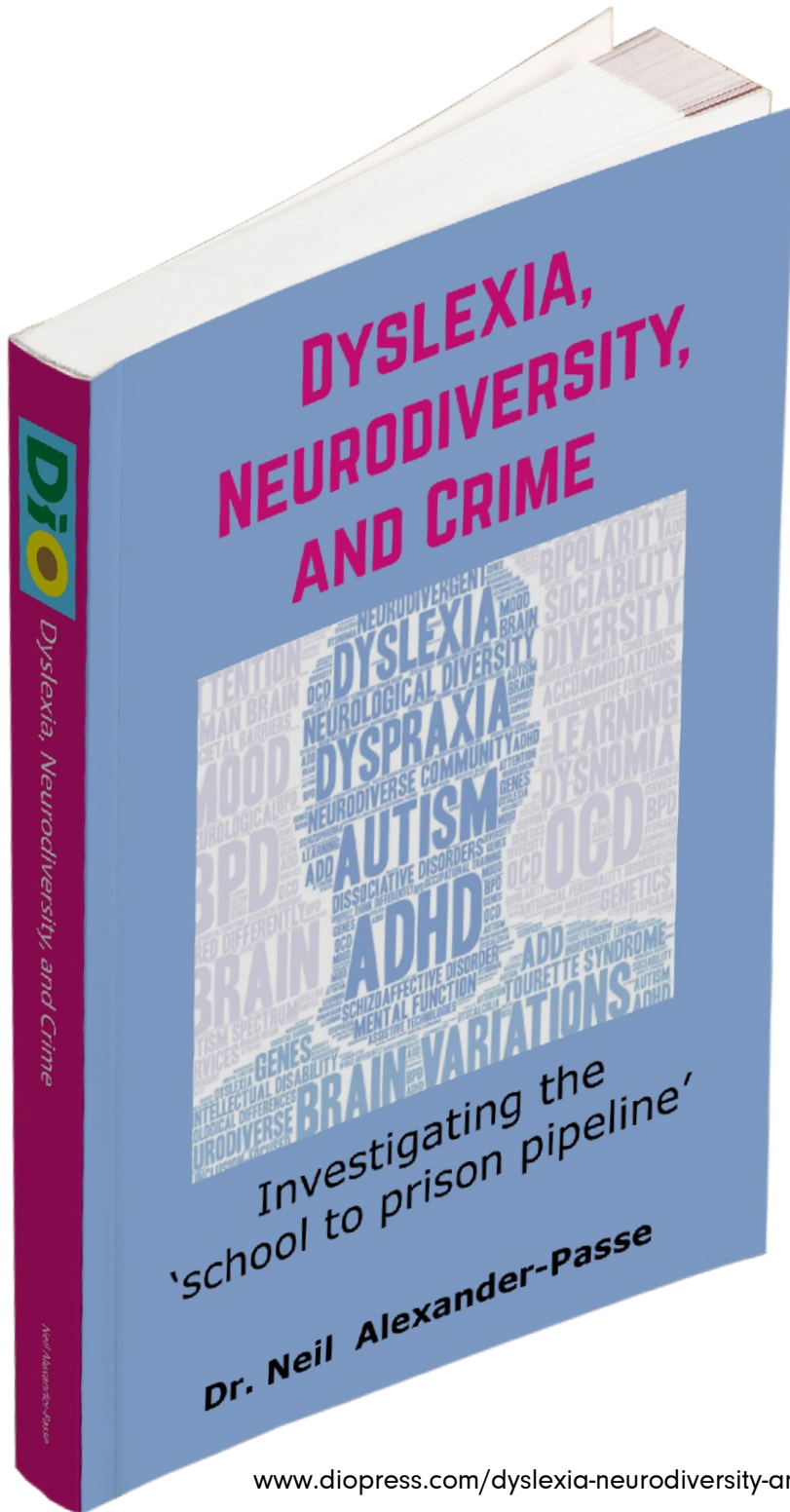
DYSLEXIA, NEURODIVERSITY, AND CRIME
BY DR NEIL ALEXANDER-PASSE

BOOK ENDORSEMENTS
This important book focuses specifically on the relationship between dyslexia, neurodiversity, and the criminal justice system. Neil takes us on a step-by-step journey, allowing us to understand where there are key points in a young person's life that can lead to moving away from a more positive path, and why someone could end up on the school-to-prison pipeline. Neil in this comprehensive book considers these different and often complex routes into crime in an erudite manner and considers importantly how we could potentially change the trajectory. Read it slowly. Read it again and think about what we can do as a society to make lasting change. This book should be read by politicians, those working in education, social work, police, law, prison and probation, and anyone interested in being a part of the change required to stop this tragic and preventable train of events for this generation, and future generations.

Professor Amanda Kirby, Honorary Professor, Cardiff University

The timely nature of this book does not go unnoticed. Neil writes as young people are picking themselves up after a global pandemic, where there is a tangible and very palpable cost of living crisis ripping through the country, and real-terms cuts in funding to support children with special educational needs and/or disabilities in schools are decimating the fabric of extant support. This book tackles the effects of insecure home-lives, lack of support in school and the potential journeys that young people can take as a result. However, as is so clearly and eruditely demonstrated by Neil in this book, professionals along the pathway do not (or cannot) take holistic views of young people in their charge. In school, lack of resources (both time and training) mean that young people's dyslexia are highly unlikely to be identified. This book is a call to arms. For those working in school with young people, for those working in social care, for those associated with the criminal justice system and to the curators of those fields in government who set policy, allocate resources, and create the structures which could facilitate pathways away from prison for young people with dyslexia and literacy difficulties.

Dr Helen Ross, Consultant & Researcher, Expert SEN & Dyslexia Advisor,
Co-Vice Chair, British Dyslexia Association

In his latest book, Dyslexia, Neurodiversity and prison: investigating the school to prison pipeline, the author Neil Alexander-Passe provides a fascinating insight into a system that seems designed to discriminate against those with dyslexia, autism and neurodiversity. Outlining the constraints in the legal process which place poor readers at a substantial disadvantage in understanding the full implications of even 'adopting a plea bargain', the author presents an authoritative analysis of failures in the system, richly illustrated with up-to-date official reports and qualitative data from the offenders themselves, which suggest many offenders may even be innocent of the charges they face. This book is unique in taking the reader through the complexities of the system, identifying risk factors not only for failure, but also for recidivism. Overall, Neil Alexander-Passe paints a sad and gloomy picture of a continuing lack of opportunity within the UK system, with a number of simple solutions to address this, in an important book that is a 'must read' for anyone with an interest in the area of literacy. I cannot recommend this book too strongly!

Angela Fawcett, Emeritus Professor, University of Swansea

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.

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:

1. *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.*
2. *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

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 non- academic 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 teaching 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 12 s Number 1 s January 2025

Contents