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Editorial Comment



Angela J. Fawcett, Editor-in-Chief

It is a very great pleasure to publish this issue of the Asia Pacific Journal of Developmental Differences, now in its 8th year of publication, which is published by the Dyslexia Association of Singapore (DAS). The response to the previous issues continues to be extremely gratifying, and we maintain these high standards in this issue and forthcoming issues. We are grateful for the support of the academics and professionals involved in resolving any issues arising, and ensuring our journal maintains high professional and ethical standards.

The seven articles featured in the current issue represent material drawn largely from Singapore, with contributions from as far afield as India and South Africa. We are particularly grateful to those contributors who have managed to revise their contributions despite the constraints of the current lockdowns internationally in response to the pandemic. Topics for the current issue cover a broad range, from articles on positive psychology, to autism in twins, with the majority focusing on dyslexia across the age range, specifically in this issue addressing the voice of the participants.

The first article in this issue adopts a rigorous traditional experimental approach, with a study from the DAS team led here by Tuty Elfira Adbul Razak, evaluating the long-term impact of the Exam Skills programme on the achievement of the children involved, comparing outcomes for 96 children, who had participated from between 1 and 3 terms in this support. The results provided clear evidence that the most effective outcomes demand the longer period of registration and continuity of support with some exceptionally strong statistical findings for improvement in scores for English in line with those needed for Primary school leaving examination for mainstream schools in Singapore.

The next article adopts a questionnaire approach, here working with parents of children in Singapore from the team at Care Corner, KidsBright, who have undertaken a mixed modality intervention based on movement, mental exercise and diet. The parents are united in advocating the strengths of this approach in improving many aspects of behaviour including attention and learning, and the authors suggest that this could be useful adjunct to more traditional interventions in future studies. An unusual approach is evident in the next article presented here, which emphasises the importance of mindfulness during this period of COVID-19 pandemic, with a contribution from Harsheeni Rajoo who has introduced these concepts throughout DAS. Here the author presents a qualitative research study in a thematic analysis on the impact of mindfulness training on the job crafting of eight of the educational advisors at DAS, in a series of questionnaires culminating most recently during the period of the coronavirus lockdown. It is a pleasure to report that the upheaval in teaching has been handled extraordinarily well over this period, not least with the support of this positive approach. It is particularly important to address research of this type during periods of additional stress and change for the world.

A very different topic is presented by Patricia Ng in the next article in this issue, a case study of non-identical twins aged 3 years 9 months, with hyperlexia. This means that their reading level is higher than both their chronological age and their understanding. Interestingly, one twin, the boy, presents with symptoms of autism, and a verbal functioning level of 1 year 6 months, suggesting savant abilities. A similar profile is not present in his twin sister, whose word recognition level is 8 years 11 months, 1.5 years higher than her level of understanding, indicating a more moderate form of hyperlexia. This is an interesting and unusual topic with a contribution to make to our understanding of the rich differences between individual children with learning differences.

The next two articles to some extent share a common theme, that of the student voice, but here they represent very different participants. The first article from Steven Sim examined the attributes mainstream adolescents found most helpful in their teachers, in terms of their outcomes. The technique used was based on pictorial cards and the Diamond 9 ranking approach. Interestingly respect, caring and patience were the top attributes in teachers that students highlighted as critical to their success. Self-concepts were more influential than teacher praise, which is in itself an important finding. The next article from Lynne Holmes and colleagues from South Africa presents an extraordinary study of the thoughts and dreams of a dyslexic adult, who was determined to become a pilot despite the difficulties he still experienced in reading. Paul, the pilot involved, developed a series of strategies to allow him to follow the instructions for pilots successfully. In this study, too, self-concepts proved to be one the most important limiting factors on the ambitions of the dyslexic adult. Taken together, these two studies have important implications for the role of self-confidence and strategy use in ensuring success for dyslexic adolescents and adults.

The final article in this issue, from Massarat and Razeema Khan from the Maharashtra Dyslexia Association, provides a solid and scholarly review of the importance of knowledge and phonological awareness in teaching children in India. This article has implications for other second language learners internationally, as well as students from low income families generally who may suffer from reduced opportunities to enhance their language skills. In conclusion this is an exciting set of studies, which has something useful to contribute for readers from all backgrounds. We would also like to commend everyone involved for their efforts to ensure that this issue of the journal can be published on time, despite the limitations world-wide in the wake of the pandemic.



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Progress monitoring of dyslexic primary school learners enrolled in an English Exam Skills Programme

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1. Dyslexia Association of Singapore

Abstract

An English Exam Skills Programme (EESP) was designed and implemented in 2013 with the primary goal of helping primary school students with dyslexia achieve in their school and national examinations, as well as become proficient users of the English language in the long run. The programme was designed to cater to the English examination needs of learners with dyslexia in language and literacy components such as grammar, spelling rules, sentence synthesis and comprehension skills. Previous studies (Leong, 2015; Leong, Asjamiah and Wang, 2017; Razak, See, Tan and Leong, 2018) have demonstrated that the programme is effective in addressing the examination needs of this group of learners through an explicit and systematic teaching methodology. However, a significant limitation in earlier research conducted on the EESP, which was the duration of each study, called for further investigation into the retention of concepts taught in the programme and its impact on students' performance and progress over time. To address this limitation, the performance of 96 primary school students, between Primary 5 to 6, who enrolled in the programme at different stages was examined using a two-way ANOVA. Progress of students who have been in the programme for 10 weeks was compared with students who have been in the programme for 20 weeks and 30 weeks. Findings of this study suggest that a full impact of support for learners with dyslexia demands longer exposure to skills and concepts in order to consolidate their learning. The results also confirm that students achieved better scores on their termly review tests when they are enrolled in the EESP over a period of 30 weeks.

Keywords: progress monitoring, assessment, literacy and language intervention, effective instruction, self-regulated learning

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INTRODUCTION

English Language is one of the compulsory subjects taken by primary school students in Singapore. As English is used as the 'lingua franca of the Internet, of science and technology and of the world', proficiency and the ability to communicate effectively in English becomes a necessity in order to equip students with the ability to survive and thrive in 'an increasingly competitive international environment' (Ministry of Education [MOE], n.d., p. 6). As such, it is greatly emphasised in the education system and is assessed in all high stakes national examinations, including the Primary School Leaving Examination (PSLE) sat by all Primary 6 students attending mainstream schools, including students diagnosed with dyslexia, prior to advancing to the next level of their educational journey (Loh and Shih, 2016).

The Ministry of Education (MOE), in its November 2018 publication, 'Professional Practice Guidelines for the Psycho-educational Assessment and Placement of Students with Special Educational Needs', defines dyslexia as '...a type of specific learning difficulty identifiable as a neurodevelopmental disorder' that primarily affects the skills involved in accurate and fluent reading and spelling. Characteristic features of dyslexia are difficulties in phonological awareness, verbal memory and processing speed. Other co-occurring difficulties '...may be seen in aspects of language' (MOE, pp. 35-39) such as reading comprehension (IDA, 2002).

Mainstream primary school students diagnosed with dyslexia attend literacy remediation classes at the Dyslexia Association of Singapore (DAS) where they are supported in areas such as reading, spelling, writing, reading comprehension and oracy using the Orton-Gillingham instructional approach that emphasises the teaching of language concepts in a direct and explicit manner and engages students' visual, auditory, kinesthetic and tactile learning modalities simultaneously. However, improvements in reading and spelling skills made by students are observed to be incongruent with scores obtained in their school English exams. Tunmer and Greaney (2008) highlighted the ímbalance between students' '...learning of new skills and actually using them' (p. 248). There exist concerns over the transferability of skills learnt in reading or spelling in dealing with other areas of language such as Reading Comprehension.

The PSLE English assesses students' proficiency in the use of the English language across a broad range of topics and skills that subsume speaking, listening, writing, grammar, vocabulary and reading comprehension skills. Questions consisted of Multiple Choice Questions (MCQ) and Open-Ended Questions (OEQ). The OEQs are in the Cloze Passage, Synthesis and Transformation and Reading Comprehension components with a total marking weightage of about 70%. These components are found in Paper 2 of the PSLE English Examinations. These are the areas in which students with dyslexia are found to be demonstrating specific challenges. The English Exam Skills Programme (EESP) was established at the DAS in 2013 to address these exam-based challenges that students with dyslexia face. Beyond that, the programme also aims to help learners become more proficient in areas other than examinations such as oral communication and written expression. These are skills useful for students in the long run to become confident users of the English language. In the process, the programme also hopes that students will enjoy learning the language through our fun and unique teaching strategies. This programme supplements the existing literacy remediation support students are currently receiving under the Main Literacy Programme (MLP). Students receive intensive support in four components -Grammar (GR), Editing (ED), Synthesis and Transformation (ST) and Reading Comprehension (CP). Concepts and skills are taught progressively and cumulatively, following the OG principles and adhering as closely as possible to the format and expectations of the school and PSLE English examinations. Students embark on the programme at Primary Three and continue to receive support until Primary Six when they sit for the PSLE. Classes are held weekly for a duration of one hour per week. Students would complete ten hourly lessons in a term, with each term consisting of 10 weeks.

As students begin enrolling in the programme at Primary Three and continue to be in the programme till Primary Six, there is a need to investigate and track the progress of students in terms of their ability to retain and apply concepts learnt over a longer period of time in the form of a longitudinal study. A single and elaborate Pre- and Post- test that encompasses the concepts and skills taught throughout a 2-year curriculum cycle has been designed. With effect from 2017, students sat for the written Pre-test upon entering the programme and the Post-Test upon leaving the programme right before their PSLE. An analysis of the Pre- and Post- results of the Entry/Exit test shall address the questions below. Student performance in each of the components of the EESP and their implications will also be examined and discussed.

- 1. What are the areas in which students' progress is measured?
- 2. How are students' progress measured? What are the criteria / indicators?
- 3. How did students perform in each component and what are the implications?

LITERATURE REVIEW

How dyslexia affects literacy and language learning and development

Difficulties with phonological processing, rapid naming, working memory and processing speed that characterise dyslexia impact the learning and development of literacy and language related skills (BDA, 2007; Nicolson and Fawcett, 2007; Crisp, Johnson and Novakovic, 2012). Challenges in reading, vocabulary and spelling encountered by learners with dyslexia as a result of these difficulties affect their ability to navigate

through long sections of text and track sequence of events or ideas. Effortful and laborious reading often contributes to frustration, reduced reading experience and motivation rather than meaningful text comprehension. A study by Snowling, Duff, Nash and Hulme (2016) that compared the language abilities of children at familial risk of dyslexia and those with none between the ages of 3 and 8, also demonstrated vastly divergent skills in receptive grammar and expressive vocabulary.

Children with dyslexia have been known to display language difficulties beyond phonological processing (Rispens and Been 2007; Shankweiler et al., 1995). In a study by McArthur, Hogben, Edwards, Heath and Mengler (2000), approximately half of a sample of children with dyslexia met the criteria for specific language impairment (SLI), which is defined as a difficulty in acquiring spoken language despite otherwise normal intellectual functioning, hearing and adequate learning environment (Leonard, 1998). Considering that learning grammar and acquiring the broader aspects of language skills require the activation of similar cognitive functions such as working memory and processing speed, it can be deduced that children with dyslexia would also experience difficulties beyond phonological aspects of language (Wijnen, 2015).

Challenges in learning faced by students with dyslexia can be further attributed to procedural learning difficulties explained by the neural-systems approach of the cerebellar functions involved in language-related skills (Fawcett and Nicolson, 2007). Since procedural learning is based on picking up skills and habits with practice so that they can be performed with little conscious effort, impaired functions in the language-based procedural learning system result in children with dyslexia having difficulties acquiring automaticity. This is further supported by the automatization deficit hypothesis (Nicolson and Fawcett, 1990), where the learning of skills by dyslexics is not automatic and fluent.

Despite these challenges, Fawcett and Nicolson (2007) suggested that children with dyslexia can still achieve at normal levels by 'consciously compensating' for their lack of automaticity. Hence, appropriate intervention for dyslexia need not be driven solely by the widely known causes of phonological deficits, but also the appropriate teaching of procedural skills (Nicolson, Fawcett, Brookes and Needle, 2010). Owing to the working memory difficulties experienced by learners with dyslexia, research investigating effective instruction suggests the importance of repetitive learning and repeated exposure to facilitate retention and enhanced automaticity leading to autonomous practice. As learning procedural skills involve learners acquiring skills in stages, gradually building on their prior knowledge, this suggests that learners with dyslexia would benefit from instruction and the teaching of skills to tackle English Examination questions that align with the OG principles of being highly structured, sequential and cumulative.

Features of English Exam that affect students with dyslexia

Peer and Reid (2002) contended that traditional methods of assessing academic abilities place students with dyslexia in a disadvantaged position as the primary mode of assessment is still centred on written tasks. During an examination, students with dyslexia may face difficulties in processing information because of challenges in reading, spelling and writing, and may also experience greater stress as a result of being in a timed assessment setting (Riddick et al., 1999). Similarly, Osborne (1999), concluded that students with dyslexia scored worse in written examinations than their peers without dyslexia. Attending mainstream schools entails these students being subjected to the rigours of school and high stakes examinations despite being given access accommodations such as additional time, single-sided papers and exemption from Mother Tongue teaching and assessment. It is thus imperative that support in tackling some of the most challenging components of the English Examination is provided to help them manage and alleviate some of the anxieties associated with the demands and conditions of examinations. The EESP has thus been established with these objectives in mind.

A previous study by Leong (2015) revealed that students who had attended the EESP made consistent progress and significant improvements, particularly in the Editing and Synthesis and Transformation components of the programme, when results from students' Pre- and Post- tests conducted on a termly basis were compared and analysed. A subsequent study by Leong, Asjamiah and Wang (2017) that compared the performance of students enrolled in the programme and those who did not, over a period of 20 weeks, examined the classroom practices and teachers' teaching style that could have contributed to students' improvement, particularly in components such as Synthesis and Transformation and Reading Comprehension components. These studies, however, measured progress within a short duration of 10 to 20 weeks (1-2 terms) and did not fully investigate the effects of direct, explicit, sequential and cumulative teaching of skills and strategies over the extended period throughout which the students are enrolled in the programme. As students typically begin enrolling in the programme at Primary Three or Four and continue to receive support until they eventually sit for the PSLE, its impact in the long term on students' progress and performance in English examination should be investigated.

Long Term Progress Monitoring

It is important that we establish how progress is defined before it can be measured and monitored, more so if support is being provided over a long duration of more than 20 weeks. Guided by the premise that it is an indication of an occurrence of learning, we would then seek to observe a demonstration of learning in terms of Sadler's three conditions - that students '...must be able to do, on demand, something they could not do

before, be able to do it independently of particular others, those others being primarily the teacher and members of a learning group (if any) and they must be able to do it well.' A student is therefore, said to have made progress when he or she is observed to have satisfied these conditions and is capable of '...mixing routinised knowledge, ...with a modicum of tentative or experimental knowledge, so as to 'do' previously unseen tasks' (Sadler, 2007, pp. 390-391). As students with dyslexia require more effort to be able to organise and internalise language concepts, they would certainly benefit from being given more time to apply and practice newly learned skills, possibly across different contexts, to promote long term retention and consolidation of learning (Becker and Domitrovich, 2011). As such, closely monitoring the process of students attaining progress in the EESP could be best facilitated by the provision of a longer duration of progress monitoring. This would allow teachers to have opportunities to evaluate instructional effectiveness throughout the period and have the flexibility to implement additional, alternative and more effective forms of instruction in the event that students do not demonstrate adequate progress in the course of examining rates of change in assessment outcomes (Cortiella, 2007; Fuchs and Fuchs, 2004; Quenemoen, Thurlow, Moen, Thompson and Morse, 2004).

Safer and Fleischman (2005) described the goal of student progress monitoring as an avenue to provide teachers with sufficient information to constantly evaluate the strengths and weaknesses of their teaching and to make adjustments in improving instructions. This goal can be reached by measuring if students are learning at a pace that matches their learning needs and abilities. Should students' rate of improvement fall below their supposed growth rate, teachers are able to modify their teaching material, and identify specific skills or components to reteach and intensify practice opportunities. Stecker et. al. (2008) further emphasized the importance of progress monitoring as an essential tool for any educational system. Gaining access to progress monitoring data empowers teachers to guide students to achieve high levels of performance as they adjust their instructional decision-making in response to student data. Becker and Domitrovich (2011) also suggest that the quality and impact of an intervention programme can be enhanced if progress is monitored when the intervention is in progress, rather than when it is completed. If intervention is viewed as a dynamic process requiring on-going refinement to meet the changing needs of the child, it ensures that students will have opportunities to adapt to intervention, thereby facilitating more effective bridging of conceptual gaps (Parkinson and Humphrey, 2008).

Progress of students over a long-term intervention in English literacy instruction

In a study by Droop, Elsäcker, Voeten and Verhoeven (2016) that explored the long-term effects of strategic reading instruction (SRI) on elementary students over a period of two years, it was found that after two years of intervention, the students in the intervention group exhibited greater growth with respect to knowledge of reading strategies than the control group. The effect size was substantial; compared with an average student of the

control group, the average student in the experimental condition improved by 21 percentile points at the end of the first year of intervention and by 25 percentile points at the end of the second year of intervention. With respect to reading comprehension skills, at the end of the second year of intervention, significant positive effects were evidenced on the general reading comprehension tests. The effect sizes were small, but consistent with other studies (Souvignier and Mokhlesgerami, 2006; Sporer et al., 2009). The improvement index in reading comprehension was about 8 percentile points at the end of the second year of intervention, while hardly any improvement was evidenced at the end of the first year of intervention.

The findings of this study corroborate earlier studies of Davis (2010), Rosenshine and Meister (1994), and Souvignier and Mokhlesgerami (2006) and fit the models of selfregulated learning, which stress that the modeling of strategies by the teacher lead to the internalization of these strategies by students who then apply the strategies when reading texts independently. As such, the modeling of strategies and the students' practice of applying these strategies during independent reading may be effective key components in the reading programme. It is also highly probable that the focus on teacher modeling and on the verbalization of strategy used provided students the opportunity to build declarative knowledge regarding the reading strategies in the first year of intervention and that the continued modeling by the teachers and the students in the second year of intervention helped the students to internalize the procedural use of the strategies when independently reading texts. The recent study by Leong, Asjamiah and Wang (2017) investigating teachers' classroom practices on a group of students with dyslexia undergoing Reading Comprehension support in the EESP observed students recalling and applying the 'thought processes modelled by their teacher' in the reading process such that they eventually became 'more self-initiated to look for contextual clues'. The teachers' repetitive and consistent use of instructions such as numbering paragraphs and words such as 'highlight' and 'keywords', established a form of routine for students to follow which guided them in their approach to guestions and locating accurate sections of text referred to in questions with greater automaticity and less hesitation (p.191).

Factors of intervention that influence sustainable and long-term progress

Becker and Domitrovich (2011) also suggested the importance of consistency in shared language and skills among teachers in contributing to long term students' progress and sustainability of positive benefits of interventions. It helps to reduce variability in implementation whereby coordinated support systems are made available to ensure that all teachers receive appropriate training and feedback on performance. Teachers who had undergone prior training and had practical teaching experience in a pedagogical approach play an important role in developing professional competence and a common value system of best teaching practices that could help foster an effective language teaching environment and learning experience for students (Leong et al, 2017). An example of this is illustrated in the study by Leong et al.,(2017) on classroom practices in the EESP that contributed to progress made by students with dyslexia. The consistent use of the RIMAIR lesson structure - Review previous concepts; Introduce new concept(s); Model application of skills; Apply with guidance; Independent application; Recap concept(s) learnt lesson structure and VAKT (Visual; Auditory; Tactile; Kinesthetic) elements, by the teacher supports student engagement and promotes better retention, thereby enhancing students' learning processes.

Research aims

This research therefore aims to evaluate and compare the progress made by students with dyslexia who are enrolled in the English Exam Skills Programme over a period of 10, 20 and 30 weeks. An earlier study by Leong, Asjamiah and Wang (2017) indicated positive outcomes by students at the end of a 20-week enrolment in the programme where students were found to have benefitted from the underlying teaching processes and procedures that teachers abided by and the classroom incidences that promoted students' learning, understanding and meaningful application of concepts. The impact of these unique teaching and classroom practices on students' retention of concepts and performance over an extended period of time covering thirty weeks will be examined.

METHODS

A. Participants

A total of 96 students made up of Primary 5 (P5) and 6 (P6) students in the Standard stream participated in this study. These are students attending mainstream schools who were diagnosed with dyslexia and attending the Main Literacy Programme (MLP) at the Dyslexia Association of Singapore for literacy intervention. They had enrolled in the EESP with the aim of improving the English subject in their school English Examinations and concerns over their readiness for the PSLE.

	TERM 4 (the previous year) + TERM 1	TERM 2	TERM 3
TOTAL STUDENTS	80	88	96
STUDENTS ENROLLED	0	8	8

Table 1. Total nu	mber of students	(Standard)
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In Term 1, there were a total of 80 participants consisting of students in primary 5 and 6 of the standard steam. All 80 students sat for the written entry test by the end of week 1, term 1. In Term 2, an additional eight new students joined the programme and sat for the written entry test by the end of week 1, term 2. Similarly, eight more new students joined the programme in term 3 and took the written entry test by week 1, term 3, bringing the total number of students to 96 at the end of Term 3. All 96 students then took the written exit test at the end of week 10, term 3.

B. Research Design and Instrument

This research takes on a longitudinal design where the performance of students in the Pre- and Post- tests administered over a period of 10, 20 and 30 weeks was examined and evaluated.

A Written Entry Test has been designed by the curriculum developers of the EESP to align as closely as possible with the format and structure of the mainstream school English Exam and PSLE, despite just covering the Synthesis and Transformation (ST), Editing (ED) and Reading Comprehension (RC) components. Amongst the series of guidelines proposed by Stecker et. al. (2008) for teachers to implement effective and meaningful progress monitoring, students' performance should be evaluated based on measures that are reliable, valid and sensitive to any improvements or lack of progress made by them. To ensure that the Written Entry Tests designed by curriculum developers in the EESP were reliable and valid, they were subjected to a validation process adhering to McNamara's (2000) "testing cycle" of the design stage, the construction stage, the try-out stage, and the operational stage (Leong, 2019). Results obtained that included both item and whole test analyses indicated substantial correlations between test takers' performances on the test designed by EESP curriculum developers and their performances on a test conducted in mainstream primary schools. Hence it can be established that the Written Entry Test's construct validity could possibly predict EESP students' performance on their school and national examinations and hence, gauge the effectiveness of its curriculum in supporting students with dyslexia in the primary schools' English examinations.

The first batch of 80 P5 and P6 Standard students sat for a Written Entry Test before the start of their first lesson at P5. It tested their knowledge, understanding and application of concepts and skills in three components - Synthesis and Transformation (S&T), Editing and Comprehension. Each of the components covered a range of topics, concepts and skills that are taught within a two-year cycle. There were 10 open-ended questions each in the S&T and Editing components and 8 open-ended questions in the Comprehension component. The first batch of 80 students sat for the Written Entry Test before the start of their first out of 10 lessons in Term 1. In Term 2, another batch of 8 new students sat for the Written Entry Test before their first out of 10 lessons in Term 3, another batch of 8 new students sat for the Written Entry Test before their first out of 10 lessons in Term 2. In Term 3, another batch of 8 new students sat for the Written Entry Test before their first out of 10 lessons in Term 1.

10 lessons in Term 3. At the end of Term 3, before the P6 students sat for their PSLE, all 96 students sat for the Written Exit Test after their 10th lesson in Term 3. The figure 1 below illustrates the process of progress monitoring for these students:

Instruction

Students who enrolled in the programme attended one hour of instruction per week for a total of 10 weeks in a term covering three components - Editing (ED), Synthesis and Transformation (ST) and Comprehension (CP). In each term, up to two hours of lesson time is allocated for ED while ST and CP components are allocated 4 hours each. For the ED component, students are given opportunities to apply and directly transfer phonogram concepts, as well as spelling and suffixing rules taught in exam-type questions. In the case of ST and CP components, lessons focus on the learning of a specific topic, as well as application of a specific strategy or skill related to the topic, in questions that are formatted to align closely with that of school exams and PSLE.



Figure 1. Progress monitoring system

Each lesson follows the R-I-M-A-I-R structure (see table 2 below) to denote the following lesson delivery processes that take place in a typical, hour-long EESP class:

Table 2. R-I-M-A-I-R structure

R	Review of previously taught concepts
I.	Introduction of new topic / concept / skill / strategy
М	Modelling of how concept / strategy is applied in questions
Α	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

Data Collection Procedures

The completed Written Entry Test and Written Exit Test scores of the three groups of students who have been in the programme for 10, 20 and 30 weeks were individually marked and their scores were tabulated and analysed at the end of Term 3. Quantitative data in the form of ANOVA test results and effect sizes of these students were recorded. Qualitative data from the Written Entry Test and Written Exit Test were also collected by analyzing the errors of each student's script, and comparing the differences between each student's pretest and posttest scripts. Their scores for each component and the types of errors made in each component were also analysed to observe demonstration of ability to apply specific skills and strategies that have been taught in the programme as each component of the written test had a specific scoring criteria. The topics and concepts taught and assessed per component will be explained in Table 3.

In the Synthesis and Transformation component, students were required to transform sentences from one form to another. For example, if a direct speech is presented as a question, students will need to know how to transform the sentence to its indirect speech form. Any form of spelling or grammatical mistake within each question would cause students to lose marks for the entire component. They were required to synthesize and transform sentences that adhere to specific ow certain grammatical patterns.

Example: Direct/Indirect Speech

2. "We have been studying for our exams since last month," said Julie.

Julie said that they had been studying for their exams since the previous month.

- 2 pronoun changes (they, their)
- Verb tense (had been studying)
- □ Time reference (the previous month)

TOPIC	CONCEPT
Spoken Questions	 Verb tenses Pronoun change Question word (if) Time Reference
Direct and Indirect Speech	 Verb Tenses Pronoun change Time Reference
Passive and Active Voice	 Verb Tenses Word Order 'by'
Contrast Words (Although, Despite)	 Verb Change Order of clause Punctuation (comma)
Much to	Word Class ChangeComma
Conditionals (If, Unless)	Position of conditional clauseNegation
Whose	 Position of Subject Noun belonging to subject after 'whose'
Neithernor	 Two negative alternatives after 'Neither' and 'Nor SVA

Table 3. Concepts and skills assessed: Synthesis and Transformation (ST)

In the above sample question, where students are required to transform the direct speech into indirect speech, a total of 3 marks will be awarded for accurate changes administered to pronouns, verb tense and time reference. Each mark is independent of each other so a student will be awarded a mark for each correct change made in his or her written response to the question.

In the comprehension component, students were expected to demonstrate both literal and inferential comprehension ability by answering questions that target the application of specific skills and strategies taught both in the process of reading and responding to questions after reading a text passage. Amongst the skills taught were pronoun and noun-pronoun referencing that helped students establish links between parts of text and the identification of 'Right There' and 'Think and Search' question types that targeted question processing skills. One mark was awarded for each accurate response given.

CONCEPTS	SKILLS
Referencing	 Personal Pronouns Demonstrative Pronouns Non-pronoun References
Signal Words	 Contrast words (however, although) Cause and Effect (Hence, Therefore)
Vocab -Context Questions	Matching words with similar meaning
Question Analysis	 Right There questions Think and Search questions
True/False Questions	 Identify keywords in statement Matching keywords with those in passage Identify relevant evidence

Table 4. Concepts and skills assessed: Comprehension (CP)

Example

Topic: Question Analysis

6. Read the question below. (2m)

Which word in paragraph 2 shows that Della was very proud of her hair?

- a. Is the question a 'right there' or a 'think and search' question? Tick the correct answer.
 - ($\sqrt{}$) Right there
 - () Think and search (1m)

Table 5. Concepts and skills assessed: Editing (ED)

TOPICS	SYLLABLE TYPES	SPELLING RULES	SUFFIXING RULES
CONCEPTS	Open/Closed	c/k/-ck/ch/-que	Doubling Rule
	Magic-e	ch/-tch	Drop-e Rule
		Soft 'c' (ce, ci, cy, s)	Y to i Rule
		Soft g (j, -dge. ge)	

Table 5 describes the range of spelling rules and patterns that students were taught during the period of intervention. During Editing lessons, students would be exposed to words that are mistakenly spelled and have flouted spelling rules. They were also taught how to identify the rules that the wrongly spelled words have violated, and make necessary changes to correct the spelling of the words. In the two examples below, students were required to apply their knowledge of the soft-g sound - /j/ to correct the misspelled word.

Example

Γ		raa]		
	IC	irge			dae	i soft a
_	 				uye,	1, <u>son g</u>

The peregrine is not a lardge bird. The male is only 35 - 45cm long and

The peregrine is not very fussy about its nest. It usually just makes a

ledge -dge, j, soft g

scrape in the earth on a cliff lej. Sometimes, it takes an old nest left behind by

The editing component taps onto their knowledge of these spelling rules and requires students to apply them to tackle misspelled words. Students were awarded 1 mark for a correctly edited word.

RESULTS

Data was tabulated and a series of statistical analyses undertaken, including both t tests and a 2-factor Anova.

The first t-test conducted was a paired samples t-test comparing the pre-test and post-test scores of students in the Standard stream in general. Results show that there is a significant difference between pre- and post-test scores for Standard students. Cohen's effect size value (d = 0.77) suggests a medium effect size confirming the progress of all the 96 students in the Standard stream. A high p value (<.001) suggests a significant difference in the performance of the students in the Post-test. (Cohen suggested that d=0.2 be considered a 'small' effect size, 0.5 represents a 'medium' effect size and 0.8 a 'large' effect size.)

A 2-factor Analysis of Variance (Anova) was undertaken with 2 levels, one between (group) and one within, (pre/post). The results indicated a main effect of time (df, 1, 2, F=35.749, p=<.000). and also of group (df1, 2, F=320.105, p=<.000).

Table 6.1 Results of Paired Samples t-test comparing pre-test and post-test scores of students in the Standard Stream

	n	Mean	SD	df	р
PRE-TEST	96	26.32	9.97	95	<.001***
POST-TEST	96	34.00	9.87		

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

To evaluate the impact of the programme by enrolment term, a 3-paired sample t-test comparing the scores of students who enrolled at 3 different stages was conducted.

Table 6.2 Results of Paired Samples t-test comparing pre-test and post-test scores of students in the Standard Stream enrolled in Term 4 (2016) and Term 1 (2017)

	n	Mean	SD	df	р
PRE-TEST	80	26.85	10.28	79	<.001***
POST-TEST	80	34.86	10.06		

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

Table 6.2 shows the results of the paired samples t-test comparing the pre-test and posttest scores of students in the Standard stream who enrolled in Term 4 in 2016 and Term 1 in 2017. Results show that there is a significant difference between pre and post-test scores for these students. Cohen's effect size value (d = 0.79) suggests a borderline large effect size suggesting progress of students who enrolled in Term 4 and Term 1.

Table 6.3 Results of Paired Samples t-test comparing pre-test and post-test scores of students in the Standard Stream enrolled in Term 2

	n	Mean	SD	df	р
PRE-TEST	8	24.75	9.66	7	0.03*
POST-TEST	8	32.63	9.36		

*p < .05

Table 6.3 shows the results of the paired samples t-test comparing the pre-test and posttest scores of students in the Standard stream who enrolled in Term 2 in 2017. Results show that there is a significant difference between pre and post-test scores for these students. Cohen's effect size value (d = 0.83) suggests a large effect size confirming the progress of students who enrolled in Term 2.

Table 6.4. Results of Paired Samples t-test comparing pre-test and post-test scores of students in the Standard Stream enrolled in Term 3

	n	Mean	SD	df	р
PRE-TEST	8	23.38	6.35	7	0.02*
POST-TEST	8	28.50	8.40		

*p < .05

Table 6.4 shows the results of the paired samples t-test comparing the pre-test and posttest scores of students in the Standard stream who enrolled in Term 3 in 2017. Results show that there is a significant difference between pre and post-test scores for these students. Cohen's effect size value (d = 0.69) suggests a medium effect size indicating progress made by students who enrolled in Term 3.

Tables 6.5 to 6.8 show the scores for individual components converted into percentage scores.

Table 6.5. Individual component progress of students in Standard Stream (96 students)

	Pretest % score	Posttest % score	Difference	P-value	Effect size
Synthesis & Transformation (ST)	51.96	66.75	+14.78	<0.01**	0.71
Editing (ED)	65.94	76.25	+10.31	<0.01**	0.45
Comprehension (CP)	34.55	50.12	+15.57	<0.01**	0.70

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

Table 6.5 shows that the post-test scores of all three components were better compared to the pre-test scores. The difference for all the three components was significant and had a medium effect size, suggesting progress attained by students in all the components.

Although students overall are seen to have made most progress in the Comprehension component as shown in Table 6.5, students' progress on individual components based on their term of enrolment into the programme was different. Tables 6.6 to 6.8 analyses students' progress on individual components based on their term of enrolment into the programme. In Table 6.6, students who enrolled in T1 2017 showed highest improvement in the Synthesis and Transformation component. However, in Tables 6.7 and 6.8, students who enrolled in T2 2017 and T3 2017 showed highest improvement in Comprehension.

	Pretest % mean score	Posttest % mean score	Difference	P-value	Effect size
Synthesis and Transformation (ST)	52.60	68.08	+15.48	<0.001***	0.97
Editing (ED)	66.88	78.13	+11.25	<0.001***	0.56
Comprehension (CP)	35.63	50.97	+15.35	<0.001***	0.83

Table 6.6 Individual component progress (T1 2017) (80 students)

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

Table 6.7 Individual component progress (T2 2017) (8 students)

	Pretest % mean score	Posttest % mean score	Differenc e	P-value	Effect size
Synthesis and Transformation (ST)	48.56	61.06	+12.50	0.1304	0.61
Editing (ED)	71.25	77.50	+6.25	0.3506	0.35
Comprehension (CP)	27.78	50.00	+22.22	0.0052**	1.41

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

	Pretest % mean score	Posttest % mean score	Difference	P-value	Effect size
Synthesis and Transformation (ST)	49.04	59.13	+10.10	0.1234	0.62
Editing (ED)	51.25	56.25	+5.00	0.1705	0.54
Comprehension (CP)	30.56	41.67	+11.11	0.1894	0.51

Table 6.8 Individual component progress (T3 2017) (8 students)

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

DISCUSSION

There is clear evidence here for the positive impact of the intervention on all 3 groups. However, results indicate that although improvements have been observed in the results of most students that are indicative of successful intervention, students who had been in the programme for a longer period of time (30 weeks, Term 1) produced significantly better results than the rest.

Students in Term 1 were observed to have made the most improvement, followed by those in Terms 2 and 3. The statistically significant p value (<0.001) in Table 6.5 in the results of students who underwent intervention for a period of 30 weeks for all three components - ST, CP and ED, as well as that of the Paired Samples t-test comparing pretest and post-test scores of students in the Standard Stream enrolled in Term 4 (2016) and Term 1 (2017) in Table 6.2, suggest that it was generally successful for everyone with improvements noted in the results of most students.

Students who underwent intervention in (T1, 2017) were observed to have made the most improvement, followed by those in Terms 2 and 3. However, there was no significant improvement observed in the score difference across all components for students who joined in Term 3. Nevertheless, the moderate effect sizes suggest that the results could have been significant with a larger group or a longer duration of intervention.

On students' performance in Synthesis and Transformation (ST)

Of the three components, ST demonstrated the largest effect size of 0.71 and an overall improvement of +14.78% in students' post-test scores, suggesting that intervention has had a significantly positive impact on students' post-test performance. A possible

explanation for this lies in the generally higher predictability of skills and question types tested in this component, allowing for more explicit and cumulative teaching and practice of concepts and skills, as well as a direct application of strategies and ease of transference between questions related to the same topic. Students need to only identify the question type, and then make reference to a given sentence or sentences for every question tested. As such, their mental resources were focused on the tackling of individual questions making it a cognitively less demanding task to accomplish.

In comparing the three groups of students who received intervention for periods of 30, 20 and 10 weeks, significant difference in progress is observed only in students who received intervention for 30 weeks (p<0.001), suggesting that a longer duration of exposure to skills and concepts is necessary for students to demonstrate improvement. Specific concepts within a topic in ST were taught in a systematic and cumulative manner. For example, in the teaching of sentence transformation from direct to indirect speech, students were progressively taught to execute changes to pronouns, time reference, punctuation and verb tenses over several lessons within a single term to facilitate a gradual process of internalisation and mastery. The longer duration of progress monitoring would also have provided students with opportunities for practice, to correct and clarify any misconceptions and better reinforce their understanding of the topic through frequent and meaningful feedback given throughout the course of the intervention, leading to a deeper understanding and retention of concepts.

On students' performance in Editing (ED)

The ED component demonstrated an overall improvement with a mean difference of +11.25 between Post- and Pre-test scores and a medium but relatively smaller effect size (0.45) than the ST and CP components reflected in Table 6.5. A significant difference in students' performance, however, is observed in students who received intervention support for 30 weeks (p<0.001), relative to those who received support for 20 and 10 weeks as seen in Tables 6.6 and 6.7, suggesting that longer exposure to skills and concepts could have contributed to improvement in students' performance in this component. The smaller effect size could be attributed to the relatively fewer lesson hours allocated to this component i.e. a total of 1.5 to 2 hours as compared to ST and CP which took up about 4 hours of lessons each, out of ten weeks' worth of lessons in a term. Students were also taught a different topic in each lesson. Editing questions are also much less predictable. Despite exposure to phonogram concepts, spelling and suffixing rules, students may not have had exposure to age-adequate vocabulary to be able to identify spelling errors and apply learnt concepts accordingly. Moreover, some of the wrongly spelled words in this component tested students' ability to apply more than just one phonogram concept, spelling pattern or rule. Students with less developed cognitive flexibility may not be able to identify or retrieve the relevant concepts or rules to apply simultaneously. These, including the shorter lesson hours accorded for consolidation, could have resulted in the relatively lower effect size.

On students' performance in Reading Comprehension (CP)

As with the ST and ED components, the CP component also demonstrated improved students' scores with a Pre- and Post- test mean difference of +15.57, a large effect size of 0.70 (Table 6.5) and a p value of <0.001 (Table 6.6) observed in students who received intervention for 30 weeks, suggesting the benefits of longer exposure to reading comprehension skills that could have contributed to significant progress made by students. It is also interesting to note the striking improvement by the group who started in term 2, possibly because their starting score was extremely low and there was more ground to recover.

A particular reading comprehension skill and strategy that was taught and emphasised in the intervention programme is 'Referencing' (Table 4.2). Crisp, Johnson and Novakovic (2012) related some of the difficulties with text comprehension experienced by students with dyslexia, in particular, that of short-term memory and sequencing, with the use of pronouns. Students were taught to identify personal and demonstrative pronouns in the text and then link them to relevant nouns or noun phrases. Also known as reference-tracking, this strategy is said to be a useful mechanism for coherence-building (Pretorius, 2005; Walter, 2005, Gernsbacher, 1990, 1997) as it helps students to monitor comprehension as they read and process given texts. Students who had received intervention over 30 weeks could have benefitted from more opportunities to apply and practice this strategy, as well as other skills in tackling reading comprehension questions, such as identifying question needs and expectations, thereby building gradual confidence over time.

IMPLICATIONS

Data findings from this result proved useful to advocate for early and prolonged intervention in supporting students with dyslexia, specifically in tackling English examination questions in order for them to better cope with the demands of the primary school English language school and national exams. While 90% of students demonstrated improved scores, it is also worthwhile to note that 10% of students showed no improvement or attained lower scores than that of the Pre-test. Data gathered from their pre- and post- tests could be further analysed to identify areas where they may need additional support or modifications to instruction that would benefit their learning. There could also be other possible areas of language-learning challenges such as poor reading fluency or language impairments that need to be addressed and may interfere with the learning of specific strategies required to attempt particular question types.

LIMITATIONS

Students of the EESP were expected to make 'reasonable' progress defined by the learning outcomes and objectives for each topic or skill taught under each component,

that were already pre-designed in the EESP curriculum. This limits the measure of progress to an external criterion rather than against individual students' starting points or learning needs.

Due to the nature and structure of the programme, intakes for EESP generally differ from term to term, with the largest intake usually coming in at the start of the year in Term 1. It should be noted that there had been comparably smaller numbers of participants who had undergone intervention for 10 and 20 weeks, as compared to those who had 30 weeks of intervention.

Progress monitoring for EESP has been largely conducted on a termly basis, testing on skills learnt only during that particular term. In addition, although the number of hours dedicated to the teaching of each of the three components for each term is similar, the topics in each component differ from one term to another. The nature and level of difficulty experienced in each topic differs from student to student and may inadvertently also affect the understanding and application of skills during the post-test results - an area that warrants further study. Safer and Fleischman (2005) recommends progress monitoring to be conducted regularly, from a range of weekly to monthly and yearly basis. This may provide greater accuracy in tracking students' progress and ability to execute skills and concepts learnt over a longer period of time.

While all student participants have a diagnosis for dyslexia, some students could possibly have other unidentified learning needs that might hinder their progress, which were not accounted for during data collection.

RECOMMENDATIONS

The scoring criteria for the pre- and post- tests were carefully and uniquely designed to analyse students' ability to apply specific skills and strategies that have been taught in the programme. This allows students to know specific areas within a topic where they may lack knowledge or understanding and offers them opportunities to clarify, ask questions, practise and bridge the gaps. In reality, however, students' progress is measured differently in schools. Disparities exist in the marking scheme and measurement of students' progress in school and national English examinations, and that practised in the EESP programme. The marking criteria for the pre and post tests are determined by the number of skills students need to know and apply within each question, whereas in school-based and national examinations, students are awarded marks based on the accuracy of the answer as a whole. Despite the fact that the majority of students showed improvements in the post-test scores, further investigation could be undertaken if this translates to similar improvements in students' school-based and national-based examinations. Many researchers have discussed the importance of setting targets and goals as a means of sustaining long-term progress and ensuring measurable outcomes for students. Hattie and Timperley (2007) highlight research which suggests that specific and well-defined goals make measures of progress more evident and reduce the gap between current and intended learning. Locke and Latham (2006) also identify the importance of specificity in relation to goal setting, emphasising that more challenging and specific goals may lead to a higher level of performance than vague and easy-to-achieve goals. Furthermore, Parkinson and Humphrey (2008) argue that any measure of success needs to be based on "visibly robust, replicable and definitively measurable" outcomes, demonstrated through the meeting of targets. Future research could involve a measurement of progress based on students' goal setting as a criterion.

Further studies on larger scales involving more grade levels or a more even sample distribution could be conducted to validate the generalization of the present findings of this study. Progress monitoring could also be made more frequent, using measures that could be easily administered and do not take away much of lesson time.

Multiple methods and formative assessments could also be developed and incorporated to measure progress of students in addition to the single-method, summative approach used in this research. Some examples of formative assessments would be goal-setting activities and game quizzes. These would provide further useful information for teachers to decide if it would be necessary to tweak the curriculum for students who may not demonstrate improved understanding or performance. Moreover, data in other nonexaminable areas such as changes in students' self-perception, confidence, motivation and self-monitoring behaviours could also be observed and collected in future research. These are useful indicators of improvement in students' use of the English Language that would be worth investigating.

CONCLUSION

Findings from this study indicate that a structured support programme was effective in improving performance in English examinations for the vast majority of children with dyslexia. Progress monitoring assessment techniques should indeed be part of all assessment systems. The data obtained can be used by the teacher to enhance instruction (in small groups or one-on-one), reteach the material, or provide additional opportunities for the student to practice certain skills. Resources could also be committed to build the necessary skills and knowledge of all teachers in measuring and establishing progress of students. Educators need information that can be used to assess how students are doing against the grade-level standards throughout the course of the year so they can determine what needs to be done to accelerate their progress towards attaining proficiency standards (Quenemon, et. al., 2004). Progress monitoring assessments can provide that information.

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Effectiveness of a Multimodal Intervention using Movement, Mental Exercise and Dietary Approaches on Children with Specific Learning Difficulties

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2. National Council of Social Service

Abstract

Since 2006, Care Corner Educational Therapy Service has been running the KidsBright multimodal intervention programme for children aged 5 – 13 with specific learning difficulties and developmental delays. The programme is a novel integration of mental, movement, and dietary approaches, and is aimed at enhancing the neurodevelopmental, learning and academic abilities of children. In this study, the purported effectiveness and feasibility of the programme is examined through test-retest analysis of 368 parent-rated forms of their child's ability level on ten outcomes over a six-month period in the programme – (i) Reading; (ii) Spelling; (iii) Handwriting; (iv) Verbal Skill; (v) Concentration; (vi) Ability to Sit Still; (vii) Memory; (viii) Motor Coordination; (ix) Social Interaction; (x) Mathematics. Findings indicated that there was indeed a significant improvement in the average ability level of children enrolled in the programme over time according to parental ratings. Subsequent analyses revealed that while parents' facilitation of home-based movement exercises were associated with improvements in many ability domains, there were no improvements associated with the child's consumption of fish oil supplements. The results also suggested that issues of service user attrition and their compliance to programme requirements may also need to be worked on in order for the programme to be more effective.

Keywords: KidsBright, Care Corner, National Council of Social Service, learning difficulties, SpLD, developmental delays, attention-deficit, ADHD, autism, ASD, dyslexia, intervention, movement, motor, mental, mathematics, numeracy, exercise, diet, nutrition, fish oil, parent, educational therapy, neurodevelopment

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INTRODUCTION

Specific Learning Difficulties and their Impact

Specific Learning Difficulties (SpLD) is an overarching term for a wide variety of learning difficulties, including Attention Deficit Hyperactivity Disorder (ADHD), dyslexia and Autism Spectrum Disorders (ASD) (British Dyslexia Association [BDA], 2018). These conditions are neurodevelopmental in nature and are classified under "Neurodevelopmental Disorders" in the latest edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-V) by the American Psychiatric Association (2013).

The DSM-V estimates that 5% to 15% of school-aged children have a learning difficulty across the academic domains of reading, writing and mathematics. The DSM-V also reports that 5% of children present with ADHD. Prevalence rates estimated locally in Singapore appear to be similar. According to a statement by Singapore's Minister for Social and Family Development, "5% of our student population have been diagnosed with special educational needs" (National Archives of Singapore, 2016), with this figure referring only to formally diagnosed cases.

Without effective support or intervention, researchers agree that children with SpLD will continue to fall behind their peers in their academic achievements. Loe and Feldman (2007) reported that "longitudinal studies show that the academic underachievement and poor educational outcomes associated with ADHD are persistent". A longitudinal study tracking children at-risk for reading disabilities from kindergarten to Grade 3 had showed that they remained behind their peers in reading abilities, and fell further behind as the years progressed (McNamara, Scissons, and Gutknecth, 2011).

Considering the substantial upper-bound prevalence rate of learning difficulties in Singapore i.e. 15%, and their potential impacts, it can be suggested that it is important for social and educational service providers to take serious effort to help these children reach their fullest potential in learning and academic achievement. The need for this challenge to be adequately met is further accentuated in view of the broader socioeconomic context of the declining birth rate in Singapore, and given the small nationstate's emphasis on finding means to develop and capitalize on all of its existing human resource. Hence, there is a need for educational professionals, leaders and policy makers to continually explore and adopt more innovative and effective solutions, as may be informed by new findings and recent knowledge in related fields like neuroscience and dietary science, to maximise intervention outcomes for these children.

Existing Approaches in Addressing Specific Learning Difficulties

Currently, the most common and conventional intervention used among professionals to address the academic underachievement of children with SpLD is remedial teaching. This

usually involves using phonologically-based and multi-sensory teaching approaches to help children with difficulties in reading. Such well-evaluated traditional approaches do have some limitations. For example, teaching phonological skills alone or even in combination with single word reading may not be adequate enough to effectively help disabled readers, as improvement in these component skills trained does not always generalise or transfer to reading skill overall (Fawcett, 2015). Also, some dyslexic children fail to respond to phonologically-based remediation programmes (Torgesen, 2000).

For ADHD specifically, the main approaches used to address its core symptoms of inattention, hyperactivity and impulsivity, are medication and behavioural interventions. However, these approaches are limited in their effectiveness: only 65% to 75% of children with ADHD respond to any single stimulant medication (Barkley, 2018), with behavioural therapy shown to be less effective than medication (Brown et al., 2005). Furthermore, the beneficent effects of stimulant medications last only for a short term i.e. not more than a day (McCabe and Shaw, 2010; Meppelink, Bruin, and Bögels, 2016); the core symptoms of the condition will return once the medication has worn off (Young and Bramham, 2012). These medications may also cause side effects such as loss of appetite, growth delay, sleep disturbance and tics (Cortese et al., 2013).

Apart from these traditional interventions for SpLD, there are also alternative or complementary interventions available in the market to help these children. These include neurofeedback; cognitive abilities training (including computer-based training); coloured lenses prescription and dietary supplementation, offered largely by private centres and practitioners. Many of these alternative interventions purport to improve the cognitive abilities of these children. However, there is the concern that many of these interventions may not have been well-studied and evaluated on their effectiveness.

Additionally, there are also concerns over the potentially high cost of these interventions, as well as whether the gains in cognitive abilities from these interventions would be translatable into tangible improvements in the children's academic abilities (e.g. reading and numeracy), which is a crucial concern for many educators and parents. For instance, Cook (2014) and Pierson (2018) have urged caution over working memory and brain training programmes, as they had concluded that such techniques do not generalise to reading, spelling, comprehension or mathematics.

These concerns result in alternative or complementary interventions not being readily adopted by parents whom may be more cautious about enrolling their children into such programmes. For educational institutions and social service providers, being publicly funded and fiscally conscious, the further lack of an evidence base for these approaches may further reduce their willingness to adopt them to help children with SpLD.

KidsBright: A Novel Multimodal Intervention to Help Children with Specific Learning Difficulties

In recognition of the various intervention needs and gaps as outlined above, in 2006 the Educational Therapy Service (ETS) at Care Corner Singapore developed a novel and potentially cost-effective programme – the KidsBright programme, to seek to improve the learning abilities and basic academic abilities of children with SpLD.

Programme Principles

KidsBright is a unique neurodevelopment programme designed for children with SpLD from age 5 to 13. This programme was developed utilizing the principles of neuroplasticity, adopting the underlying premise that symptoms of SpLD and ADHD are due to delayed maturation of certain regions of the brain. The programme innovatively integrates the three modalities of movement exercise, mental exercise and dietary approach to enhance the neurodevelopment, and hence the learning and academic abilities of the children.

The programme comprises of weekly sessions for children, with a typical class size between 3 – 5 children; and three parent training sessions, where parents are trained on the theory and practical aspects of implementing various therapeutic exercises for their children at the home front. The parent training sessions are conducted at the start of the programme, and at every 10-to-12-week intervals thereafter.

While KidsBright is conducted as a 6-month programme today, prior to 1 March 2013, the programme lasted over a 9-month period.

Movement Exercises

Eclectically designed by Care Corner ETS, the specific movement exercises in KidsBright are adapted from effective and easy-to-implement components from various movement therapy approaches (e.g. Blomberg (2015), Pheloung (2018) and Promislow (1999)). Parents attending the training classes in the programme are taught how to assist their children to carry out a set of specific movement exercises (which takes about 10 minutes) at home, and they are instructed to carry them out at least four times a week. An example of a parent-assisted movement exercise incorporated in KidsBright involves parents rocking children through repetitive pulling motions applied on their calves (see Figure 1). This is in augmentation to weekly sessions on ETS premises, where children perform a series of (partially different) movement exercises are implemented every 10 – 12 weeks. These exercises are targeted at enhancing the children's neurodevelopment, through (1) integrating retained primitive reflexes, (2) providing vestibular, proprioceptive and tactile stimulation, and (3) developing bilateral coordination, which benefits the learning and academic abilities of children with SpLD. The rationale for each of these achieving each of these goals are elaborated below:



Figure 1. An ETS educational therapist guides parents on how to perform the movement exercise with their children in a training session.

Rationale of Integrating Retained Primitive Reflexes. Primitive reflexes refer to automatic and stereotyped movements developed before birth, which are essential for a newborn's initial survival. However, over the first year of life in normal development, they would be expected to be gradually inhibited and transformed by the developing brain into more mature reactions (Goddard, 2002). This process is known as reflex integration.

Primitive reflexes and reflex integration have been regarded to be foundational to intelligence and cognitive development (Piaget, 1952; Masgutova, 2015). However, various factors such as illness, trauma, developmental or neurological impairment, and lack of movement of the baby are known to hinder reflex integration (Goddard, 2002). These primitive reflexes may then be retained (i.e. remain active) as the child grows older, and has been observed in some studies to be associated with learning difficulties in school-aged children. For instance, McPhillips and Jordan-Black (2007) had found a

statistically significant relationship between poor reading attainment and a high level of retained Asymmetrical Tonic Neck Reflex (ATNR) among children with reading difficulties (dyslexia). Retained primitive reflexes have also been shown to cause various developmental issues like poor reading ability, hyper-sensitivity, poor memory and attention (Goddard, 2002; Grigg, Fox-Turnbull, and Culpan, 2018).

At the same time, retained primitive reflexes are thought to be amenable to remediation. Specific stereotyped movements carried out regularly over a period of time could facilitate integration of these reflexes (Goddard, 2002). This was affirmed by a randomised, double-blind, controlled trial on 60 children aged 8 to 11 years, which had found that children with reading difficulties were able to successfully make significant gains in reading, after carrying out a specific movement sequence to integrate the retained primitive reflexes (McPhillips, Hepper and Mulhern, 2000).

Rationale of Providing Vestibular, Proprioceptive and Tactile Stimulation. According to Blomberg and Dempsey (2011), the brain of the child with ADHD or related difficulties may not have received adequate sensory stimulation for the neurons to branch off and create new synapses, and for sufficient myelination of the nerves to take place. This is thought to result in delays in the development and necessary linking up of different parts of the brain, affecting brain functioning as a whole.

The performance of frequent movement exercises is thought to provide a counteraction to these effects, through providing the child with vestibular, proprioceptive and tactile stimulation, which encourages the growth of the neural networks in the brainstem, cerebellum, basal ganglia and neocortex. For children with ADHD and related attentional difficulties whom are able to have their lack of sensory stimulation remediated in this way, this may result in improvements in their attention span, and a consequent reduction in hyperactivity and impulsivity.

Rationale of Developing Bilateral Coordination. Bilateral coordination or integration refers to the ability to use both sides of the body at the same time in a controlled and organized manner. Children who do not develop this ability adequately may have difficulties performing tasks such as writing, tying shoelaces and higher-level tasks like reading. Studies have also shown that the academic performance of children is correlated to their ability at bilateral coordination (da Silva Pacheco, Gabbard, Ries, and Bobbio, 2016).

Mental Exercises

The second modality in KidsBright – mental exercises, refer to an intervention approach of using quick mathematical calculations to enhance the development of the brain, especially the prefrontal cortex region. This approach is based upon work done by Kawashima (2005) who found that performing quick simple mathematical calculations is an effective way to stimulate the prefrontal cortex, as observed through images taken by functional magnetic resonance imaging (fMRI) and near-infrared spectroscopy. Takeuchi et al. (2016) had similarly found that doing quick simple mathematical calculations effectively stimulates the prefrontal cortex, improving their processing speed, and performance at speeded executive function tasks. There was also an improvement in the plasticity of brain structures and perfusion.

In the KidsBright programme, mental exercises are implemented via tasking children to solve a series of mathematical calculation problems as quickly as possible within a short period. Examples of the calculation problems are "3 + 6 = ?" and "7 - 4 = ?". The difficulty of the problems assigned are pegged to each individual child's numeracy level, as assessed by Care Corner educational therapists. Children were instructed to attempt the mental exercises given to them at least four days a week, if not on a daily basis. Parents are also taught during the parent training classes on the theory of this intervention approach and how they could practically support their children in this where needed.

Dietary Approach

The final modality – the dietary approach in KidsBright involves enhancing children's cognitive functioning, through changing their diets to reduce their consumption of food additives and increasing their intake of essential nutrients to support optimal brain development. In the programme, parents are educated through training sessions on the importance of such a diet and given practical tips on how to implement it in their children's daily life. Concurrently, children are also given basic education on this diet. The topics in the parent training cover:

1. Avoiding artificial food additives (e.g. colourings, preservatives)

Parents are instructed to avoid food items containing artificial food additives, but are taught to identify alternative food items which could be lower in such additives e.g. specific types of tidbits. The explanation to parents on the need to avoid food additives is based on work done by McCann et al. (2007), which found that food additives exacerbate hyperactive behaviours (inattention, impulsivity and overactivity) into middle childhood.

2. Having a balanced diet

This includes emphasis on the importance of fruits and vegetables, consuming whole grains and unsaturated fats, and having a good source of protein. This is in line with the dietary recommendations for children with ADHD from Harvard Health (2009), as well as general dietary recommendations for children in Singapore from the KK Women's and Children's Hospital (n.d.).

3. Taking fish oil supplements as a source of omega-3 fatty acids

Rationale

Omega-3 fatty acids are a type of polyunsaturated fatty acids (PUFAs). Docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA) and alpha-linolenic acid (ALA) are among the three main forms of Omega-3 found, with Omega-3s in general having been found to be essential for normal brain development and function (Taylor and Connock, 2007). DHA in particular has also been found to play a vital role in neurite growth, membrane fluidity, neurotransmission and neuronal survival (Parletta, Milte, and Meyer, 2013).

According to Parletta, Niyonsenga and Duff (2016), and Hawkey and Nigg (2014), children with ADHD and ASD have lower internal levels of Omega-3. These claims are also consistent with a study on UK mainstream school children underperforming in reading, which had found correlations between lower DHA levels, and poorer reading ability and working memory performance (Montgomery, Burton, Sewell, Spreckelsen and Richardson, 2013).

As Omega-3 fatty acids cannot be synthesized in the human body, they must be obtained through dietary source (Simopoulos, 2008). In a regular diet, DHA and EPA would be found mostly in oily fish, and ALA mainly in some green vegetables, nuts and seeds (Harvard Health, 2016). With Kidd (2007) suggesting that the two most beneficial forms of Omega-3s for childhood brain development are DHA and EPA, there is hence reason for children with SpLD to ensure that they receive sufficient intake of fish oil, for which dietary supplements could be a good source of. While later studies had found mixed outcomes for children across different conditions receiving Omega-3 fatty acids supplementation (see Montgomery et al., 2018), in some earlier studies it had been found to be an effective intervention for children with ADHD (Hawkey and Nigg, 2014; Sonuga-Barke et al., 2013) ¹.

Implementation

In the KidsBright programme, parents were educated on fish oil supplements available in the local market, and encouraged to purchase and administer them to their children, with dosage recommendations provided by ETS therapists. The dosage recommendations were consistent with average Omega-3 fatty acids dosages used in studies on Omega-3s supplementation and ADHD

^{1.} The KidsBright programme developers had made the professional judgment to implement fish oil / Omega-3s supplementation as part of the programme, as there was a positive risk-benefit ratio involved.

symptoms (Hawkey and Nigg, 2014; Bos et al., 2015). Parents were also instructed to choose fish oil supplements that are highly purified, free of environmental pollutants such as methylmercury, a neurotoxin that could be found in less-purified forms of fish oil and impair neural development (Cleland, James, and Proudman, 2006).

As an alternative to fish oil supplementation, parents were also told to provide more fatty fish in the child's diet. This was especially for parents from lowerincome households, who may have difficulty in affording fish oil supplements.

Evaluating the Effectiveness of the KidsBright Programme

While the KidsBright programme has been continuously run for the past decade, no formal evaluation of its effectiveness for its service users has yet been undertaken. It is not known if the integration of the mental, movement, and dietary therapy approaches has led to actual benefit for the children as theorized by the programme developers, and if there are aspects lacking in implementation.

In this study, the aims of the authors are thus to provide some understanding into these areas through addressing the following research questions:

- 1. Have children enrolled in the KidsBright programme improved over time in their previously weak abilities?
- 2. Were families enrolled in the programme able to comply fully with the therapeutic advice given by the programme educational therapists, and remain involved in the programme?
- 3. Can the children's improvements in abilities truly be attributed to each therapeutic component theorized to bring about change in the programme? In this research, this will be limited to assessing the effect of doing home movement exercises and taking fish oil supplements.

METHODS

Participants

Source: Data for this research came from a retrospective sample of 368 parentparticipants enrolled in the KidsBright programme over a 10-year period between 21 August 2008 to 6 September 2018. These parents had been enrolled into KidsBright together with their child whom had either presented symptoms of, or had been diagnosed with SpLD. More than 60% of parents were known to have been referred or had heard about the programme from formal sources i.e. social service agency (45.4%), school (8.7%), or healthcare provider (7.6%). The remainder were self-referrals (29.9%), referrals from a non-professional such as a friend or relative (5.2%), or from an unknown source (3.3%).

Children's Difficulties and Diagnoses: Half of the children enrolled in the programme (51.1%; n = 188) had received a specialist's diagnosis for their primary difficulty. The modal diagnosis was ADHD (inclusive of inattentive ADHD; 47.3%), followed by dyslexia (13.8%), ASD (13.3%), language difficulty (10.1%), global developmental delay (5.9%), and slow learning (3.7%). Other diagnoses (5.9%) included reading, motor, sensory, mathematics difficulties and difficulties not otherwise specified. About a-third of these children (n = 63) had multiple diagnosed difficulties.

Of the remainder without a formal diagnosis available for their primary difficulty, the presenting issue in most of these cases were attention-related difficulties (50.0%)². 18.3% presented with reading-related difficulties, and the remaining included difficulties in language function, motor function, sensory function, and mathematics; slow learning and low intellectual quotient (IQ), and other difficulties not otherwise specified.

Children's Gender: The majority of the children were males (77.2%; n = 284). A statistically significant, higher proportion of males (63.4%) were known to have visited with a specialist to seek a diagnosis for their primary learning difficulty, as compared to females (36.9%).

Children's Age and School Level: The ages of children ranged from 4 years to 13 years, at the point of their start in the programme. The median child was 8 years old. Most children were attending primary school (90.5%), with 9.2% still in kindergarten and one child in secondary school.

Children's Ethnicity: Most children (89.7%) enrolled in the programme were ethnically Chinese. Malay and Indian children comprised 3.3% and 3.5% of the sample respectively, and the remaining 3.5% were of other ethnic groups.

Household Income Per Capita: Information on the household income per capita (PCI) had been sought from parents at the point of enrolment, but not in a consistent manner, with overlapping income-bands being used across respondents. Hence, there was some

^{2.} The needs of these children were identified by Care Corner educational therapists, who had taken developmental and medical histories of all children, as well as teacher-reports, upon their enrolment into the programme.

uncertainty in the PCI breakdown of families. Taking a PCI of \$700 as a breakpoint 3 , it was determined that between 44.8 – 46.5% of families in the sample could be classified as low-income (below the breakpoint).

Parent Rating Assessment form: The main measure that was used for the research, the parent rating form, had been conceptualized during the initial years of the KidsBright programme by staff at Care Corner ETS, out of need to allow the attending educational therapist a basic gauge of tracking the child's progress through the programme. It is an original measure by Care Corner ETS and has not been tested elsewhere for validity and reliability. The language of the form is in English, but co-presented with Mandarin translations. Items on the form are relatively straightforward, and seek parents' self-perception regarding the current level of their child on ten learning and academic abilities outcomes, according to a 5-point Likert-type scale (1 - Very Weak; 2 - Moderately Weak; 3 - Marginally Weak; 4 - Acceptable/Average; 5 - Good):

- a. Reading;
- b. Spelling;
- c. Handwriting;
- d. Verbal Skill;
- e. Concentration;
- f. Ability to Sit Still;
- g. Memory;
- h. Motor Coordination;
- i. Social Interaction;
- j. Mathematics

In addition, the form also sought information on the child's compliance to two programmatic components, through asking (1) the average number of times weekly movement exercises the child did at home, and (2) the average number of times weekly consumption of fish oil supplements by the child, since the previous rating. Parents responded to this section according to a frequency scale (0 – 6 times each week on average, rounded to the nearest whole number); this section is not queried in the pretest.

For each rating, respondents were presented the same form in which they had filled in their pre-test, and respondents were instructed to mark the rating at each time-point using a different shape. The questionnaire may be referred to in Annex A.

^{3.} As a point of comparison, children from households with a monthly PCI of \$690 and lower would be eligible for the Ministry of Education Financial Assistance Scheme (FAS). The \$700 cutoff set here will be a close approximation to that.

PROCEDURES

Data Collection

Upon enrolment in the programme, parents had provided demographic information about their family to Care Corner ETS. As part of the enrolment package, the parent rating assessment form was subsequently given to parents by ETS educational therapists to complete. The parents were re-administered this form at two further time-points in the programme: (1) approximately 3 months after the start of programme; and (2) approximately 6 months after the start of programme ⁴.

Data Coding

All data had been originally provided in the form of hardcopies. Care Corner ETS subsequently coded all available data and made available the full, de-identified digital dataset to the National Council of Social Service (NCSS) in 2019, which conducted the data analysis. Some administrative data which was not collected through the parent rating form earlier, such as the start and exit dates of the child in the programme, and other demographics were also included in the dataset. Prior to commencing planned analyses, the data was cleaned by NCSS, which involved rectifying typographic errors, and excluding responses which were returned too early or late (more than a month before or after they were supposed to have been administered in the programme).

Data Analysis

With the cleaned dataset, basic descriptive analyses and a series of univariate repeated -measures analysis of variance (RM-ANOVA) were undertaken in IBM SPSS software (IBM Corporation, 2016) to ascertain if there had been significant changes in each ability score over time, per the parent rating forms. The attrition rate of families in the programme over time was also analysed through examining each child's record of their start and exit date in the programme, and missing values were analysed then.

The lavaan R package for structural equation modelling (Rosseel, 2012), running atop the open-source R statistical computing engine and RStudio frontend (R Foundation for Statistical Computing, 2019; RStudio Team, 2018) was used for linear growth curve modelling (Duncan, Duncan and Strycker, 2013; Muniz-Terrera et al., 2017) of the change

^{4.} Parents enrolled in the programme prior to 1 March 2013 had the parent rating form administered to them a fourth time, at approximately 9 months into the programme; this was when the KidsBright programme was run as a longer-duration programme of between 9 – 12 months. These forms were excluded from the analysis. There were no forms administered at the 9-month mark after 1 March 2013.

in ability scores across each rating (time), and across different frequencies of movement exercises done and fish oil supplements consumed at each rating.

All variables collected through the parent rating form were inspected and assessed to be approximately normally distributed. 11.3% of observations were missing (of an expected total of 11,040 observations – for 368 parents rating 10 abilities at 3 timepoints), before accounting for participant attrition in the programme. After adjusting for attrition, the proportion of accidental omissions fell to 7.5%. Missing values analysis suggested the data to be at least missing at random (MAR), as there was no trend (per Fisher's exact tests) that the omissions were correlated with their past ability ratings. Hence, planned analyses were unlikely to be biased by missing data, and for the RM-ANOVA analyses, cases with missing values were excluded on an analysis-by-analysis level.

RESULTS

Improvements Observed for Children over Time

Across all the ten abilities measured in the parents rating form: RM-ANOVAs for each of the ten ability scores (Reading; Spelling; Handwriting; Verbal Skill; Concentration; Ability to Sit Still; Memory; Motor Coordination; Social Interaction; Mathematics) by time of rating (at pre-test; at 3 months; at 6 months), were conducted for the entire sample (N = 368), with lower-bound (conservative) corrections performed as Mauchly's W tests had suggested that assumptions of sphericity had not been met. These analyses demonstrated that children enrolled in the KidsBright programme, since its inception, had improved in their mean abilities scores for all abilities, over time (see Table 1).

In Initially Weak Areas: As the KidsBright programme had a specific interest in trying to improve the abilities of children in their weak areas, rather than just in improving abilities in general, subsequent analyses were further scoped to ascertain if improvements over time had been observed for participants in areas which were rated to be weak at pretest i.e. rated between 1 to 3. The proportion of children reported to be weak in each of the ten ability areas may be referred to in Table 2. Based on the median, most parents (60.1%) had rated their children to be weak on at least seven out of ten abilities, and all children were weak in at least one ability.

RM-ANOVAs for each of the ten ability scores by time of rating were hence conducted, this time limiting to each sample only the children whom had reported weak scores on the ability at pretest, since the programme's inception. Lower-bound (conservative) corrections on the degrees-of-freedom were again performed as Mauchly's W tests had suggested that assumptions of sphericity had not been met. These analyses supported the view that even for children who were weak in an ability initially, their mean score for that ability had improved over time in the programme (see Table 3).

, 11 - 1 A	Time of			RM-AN	IOVA∘				Bont	feronni Compar	isons
ADIIITY	Rating	Ν	SD	F	df	SW	d	η_{p}^{2}	At Pre-Test	At 3 Months	At 6 Months
:	At Pre-Test	2.92	1.26					-		**	**
Keading	At 3 Months	3.30	1.14	160.66	1.00	73.42	< .001	.38	**		**
(AC7 = U)	At 6 Months	3.67	1.08						**	**	
÷	At Pre-Test	3.00	1.24							**	**
spelling	At 3 Months	3.42	1.13	170.77	1.00	73.21	< .001	.41	**		**
(n = 241)	At 6 Months	3.77	1.10						**	**	
-	At Pre-Test	2.78	1.06							**	**
Handwriting	At 3 Months	3.22	0.98	153.85	1.00	71.55	< .001	.37	**		**
(no7 – 11)	At 6 Months	3.52	0.90						* *	**	
	At Pre-Test	3.12	1.14							**	**
Verdal Skill	At 3 Months	3.50	1.02	132.82	1.00	64.63	< .001	.34	* *		* *
(no7 = <i>u</i>)	At 6 Months	3.82	0.87						* *	**	
:	At Pre-Test	3.12	1.14							**	**
oncentration	At 3 Months	3.50	1.02	244.46	1.00	123.25	< .001	.49	**		**
(407 - 11)	At 6 Months	3.82	0.87						* *	**	
Motor	At Pre-Test	3.48	1.05							**	**
Coordination	At 3 Months	3.77	0.93	79.05	1.00	29.99	< .001	.24	* *		* *
(n = 247)	At 6 Months	3.97	0.82						* *	**	
	At Pre-Test	2.64	1.08							**	**
	At 3 Months	3.09	1.02	162.17	1.00	88.21	< .001	.39	* *		**
(0C7 _ 1/)	At 6 Months	3.47	0.97						**	**	
	At Pre-Test	2.88	1.13							**	**
Memory	At 3 Months	3.26	1.06	146.05	1.00	64.26	< .001	.36	* *		* *
(oc7 - 11)	At 6 Months	3.59	0.96						* *	**	
Social	At Pre-Test	3.47	1.05							**	* *
Interaction	At 3 Months	3.76	0.96	115.86	1.00	35.20	< .001	.31	* *		* *
(n = 258)	At 6 Months	3.99	0.89						**	**	
	At Pre-Test	2.47	1.15							**	**
viatnematics	At 3 Months	2.93	1.15	182.06	1.00	95.88	< .001	.41	* *		**
(707 - 11)	At & Monthe	7 7 7	1 0.4						**	**	

Ability	% Of Entire Sample	% Of Sample Enrolled before 1 March 2013	% Of Sample Enrolled after 1 March 2013
Reading	65%	73%	42%
Spelling	64%	70%	47%
Handwriting	73%	75%	67%
Verbal Skill	59%	64%	46%
Concentration	93%	94%	9 1%
Motor Coordination	77%	77%	78%
Sitting Still	71%	75%	62%
Memory	46%	47%	44%
Social Interaction	49 %	49 %	50%
Mathematics	78%	85%	59%

Table 2: Proportion of Children Reported to be Weak in Ability at Pre-Test

Note. nOf Entire Sample = 368; nOf Sample Enrolled before 1 March 2013 = 266; nOf Sample Enrolled after 1 March 2013 = 102.

Families' Involvement and Compliance with the Programme

Programme Involvement: The attrition rate of families from the programme was assessed. Based on the programme start and exit date records available, the KidsBright programme since its inception (N = 368) had managed to keep about 90% (n = 330) of all children enrolled engaged in the programme for at least a period of five-and-a-half months.

Repeated-Measures ANOVA of Ability Score by Rating for Entire Sample in Initially Weak Areas, with Bonferroni-÷ ć Ċ Table 3:

A hility.	Time of			RN	ANOVA				Bonfe	eronni Compaı	risons
ADIIIIY	Rating	М	SD	F	df	SM	d	η_{ρ^2}	At Pre-Test	At 3 Months	At 6 Months
	At Pre-Test	2.12	0.79							* *	**
Keaaing	At 3 Months	2.69	0.93	195.14	1.00	90.92	< .001	.54	**		* *
(col - u)	At 6 Months	3.17	0.97						**	* *	
	At Pre-Test	2.18	0.78							* *	* *
Spelling	At 3 Months	2.81	0.97	192.12	1.00	89.21	< .001	.56	**		* *
(⁊c1 = <i>u</i>)	At 6 Months	3.26	1.06						**	* *	
:	At Pre-Test	2.26	0.72							**	**
Handwriting	At 3 Months	2.82	0.82	189.39	1.00	88.89	< .001	.50	**		* *
(oo1 <i> 1</i> 1)	At 6 Months	3.23	0.83						**	* *	
	At Pre-Test	2.32	0.68							**	**
Verbal Skill	At 3 Months	2.90	0.81	176.62	1.00	93.33	< .001	.53	**		**
(ccl - u)	At 6 Months	3.41	0.82						**	* *	
Concentratio	At Pre-Test	1.97	0.75							**	**
c	At 3 Months	2.56	0.86	253.25	1.00	127.51	< .001	.52	**		**
(n = 239)	At 6 Months	3.00	0.93						**	* *	
Motor	At Pre-Test	2.42	0.68							* *	**
Coordination	At 3 Months	3.03	0.88	109.95	1.00	50.94	< .001	.52	**		**
(n = 104)	At 6 Months	3.40	0.78						**	* *	
[];tJ ~~;tt;J	At Pre-Test	2.17	0.72							* *	**
	At 3 Months	2.75	0.86	191.85	1.00	106.57	< .001	.49	**		**
(01 - 11)	At 6 Months	3.21	0.91						**	**	
	At Pre-Test	2.28	0.72							* *	**
Memory / n = 181)	At 3 Months	2.77	0.84	185.85	1.00	83.65	< .001	.51	**		**
(101 - 11)	At 6 Months	3.24	0.87						**	**	
Social	At Pre-Test	2.44	0.64							* *	**
Interaction	At 3 Months	2.95	0.78	110.47	1.00	41.09	< .001	.50	**		**
(n = 111)	At 6 Months	3.30	0.80						**	**	
1 athom ation	At Pre-Test	2.01	0.82							* *	**
/ n = 205)	At 3 Months	2.56	0.99	198.00	1.00	105.73	< .001	.49	**		**
	At 6 Monthe	7 U 7	0 05						**	**	

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Programme Compliance: At each time-point (at 3 months; at 6 months) on average, about 2 in 3 parents were able to ensure that their children had completed at least 4 times of movement exercises weekly (the minimum per ETS therapists' recommendation) – 67% out of 349 were able to do so at 3 months, and 66% out of 293 were able to do so at 6 months. About 1 in 2 ensured that their children had at least 4 times weekly intake of fish oil supplements (the minimum per ETS therapists' recommendation) – 56% out of 348 were able to do so at 3 months, and 59% out of 293 were able to do so at 6 months. Excluding missing responses, only about two-fifths of parents were able to ensure that both requirements were met at each time-point.



Figure 2. Simplified path diagram of bivariate linear growth model used for fitting. All exogenous variables are allowed to freely correlate with each other; paths are not shown to maintain a clearer presentation. Intercepts and error variances are also not shown to maintain a clearer presentation.

		χ² sto	tistic	s			RMSE	A statistics	
Ability	п	χ² estimate	df	p	CFI	TLI	RMSEA	90% CI	SRMR
Reading	235	3.776	9	.926	1.000	1.000	.000	[.000, .028]	.035
Spelling	217	6.558	9	.683	1.000	1.000	.000	[.000, .069]	.045
Handwriting	267	8.659	9	.478	1.000	1.000	.000	[.000, .082]	.040
Verbal Skill	213	13.685	9	.134	.971	.952	.058	[.000, .117]	.044
Concentration	341	13.217	9	.153	.989	.981	.042	[.000, .087]	.044
Sitting Still	279	13.594	9	.138	.981	.969	.051	[.000, .103]	.052
Memory	257	10.255	9	.330	.995	.992	.029	[.000, .096]	.057
Motor Coordination	160	13.992	9	.123	.967	.946	.067	[.000, .131]	.048
Social Interaction	176	19.283	9	.023	.941	.901	.102	[.036, .165]	.081
Mathematics	284	14.339	9	.111	.980	.967	.058	[.000, .112]	.063

Table 4: Model Fit Statistics for Linear Growth Curve Model, with Fish Oil Supplement Intake and Movement Exercise Conduct as Time-Varying Covariates, for Sample in Initially Weak Areas

Note. A robust maximum-likelihood (MLR) estimator was used for modelling, with full-information maximum-likelihood performed on missing values.

Attribution to Programmatic Components

Model Fitting: Bivariate linear growth curve models (LCGM; see Figure 2) were fit to each ability, for each subsample of respondents with weak scores in the ability at pretest. Each growth curve was fit for 3 time-points: at pre-test (0 months), 3 months, and 6 months. The frequency of fish oil supplements taken, and frequency of movement exercises done on average for each participant, were introduced as linear-continuous time-varying exogenous variables. All models produced evidenced a generally good fit to the data, suggesting their validity for interpretation (see Table 4).

Subsequently, the estimated intercept and slope values of the growth in ability score over time for participants, as well as the effect taking fish oil supplements and doing movement exercises had on the ability level at 3 months and 6 months from the models fit are reported in Table 5. These parameters were interpreted. ⁵

	\boldsymbol{N}	1		1	8	
	Intercept	Slope	f(Fish Oil Supplements at 3 months)	f(Fish Oil Supplements at 6 Months)	f(Movement Exercise at 3 Months)	f(Movement Exercise at 6 Months)
Reading	2.153	0.431	-0.006	-0.020	0.039 [.]	0.060 [.]
Spelling	2.198	0.464	-0.015	-0.026	0.053"	0.062 [.]
Handwriting	2.268	0.356	0.006	0.032	0.041 [.]	0.039
Verbal Skill	2.299	0.478	0.002	0.001	0.028	0.039
Concentration	1.989	0.441	-0.027	-0.028	0.051	0.059 [.]
Sitting Still	2.198	0.432	-0.015	-0.041	0.042 [.]	0.080 [.]
Memory	2.305	0.399	-0.031	-0.012	0.045 [.]	0.051
Motor Coordination	2.386	0.477	0.030	0.003	-0.007	0.004
Social Interaction	2.429	0.380	0.014	0.024	0.018	0.010
Mathematics	1.995	0.453"	-0.007	0.001	0.038 [.]	0.033

Table 5: Intercepts, Slopes and Effects of Time-Varying Covariates for Linear Growth Curve Model, with Fish Oil Supplement Intake and Movement Exercise Conduct as Time-Varying Covariates, for Sample in Initially Weak Areas

Note. $p^* < .05$. $p^* < .01$. A robust maximum-likelihood (MLR) estimator was used for modelling, with fullinformation maximum-likelihood performed on missing values.

5. With reference to Table 5, the interpretation of the coefficients would be as such: for an average child starting out in the programme with a Reading score of about 2.15 (intercept term), an increase of 0.43 points (slope term) had been observed for every 3 months' passing in the programme. Between two children, holding all other factors constant, the child who had performed one more movement exercise per week during their first 3 months in the programme, over the other, would have improved in their Spelling score by 0.039 points more than the other (beta-coefficient estimated of $f_{Movement Exercise}$ (3 Months)). If the first child had performed two more movement exercises per week in the 3rd to 6th month of the programme than the second child, then an improvement of 0.120 points (2 units x beta-coefficient estimated of $f_{Movement}$ Exercise (6 Months)) over the second child was observed.

Effect of Time in Programme: It can be demonstrated from the LCGM that in general across all abilities, children's ability level had increased with time passed in the programme.

Effect of Taking Fish Oil Supplements: For the measured programmatic component of taking fish oil supplements, the LCGM did not offer statistical support for the view that it had helped with improving participant ability levels over time, for any ability.

Effect of Performing Home Movement Exercises: For the measured programmatic component of performing home movement exercises, consistent positive effects were found from the LCGM for it to result in improvements in Reading; Spelling; Concentration, and Sitting Still, for participants who were initially weak in those areas.

For those initially weak in Handwriting, Memory and Mathematics, only partial evidence was found for movement exercise to have a positive effect. The hypothesized beneficial effect of movement exercise appeared to be present at 3 months, but was not sustained at 6 months.

DISCUSSION

Summary of Results

The study had set out to evaluate: whether the KidsBright programme in Singapore had been effective to help children enrolled in the programme, to improve in their previous weak learning and academic outcomes, and whether families in the programme had been able to comply with the requirements of the KidsBright programme. It also aimed to test the validity of a specific part of the KidsBright programme logic model, on whether home movement exercises, and fish oil supplementation, contributed to better child outcomes in the programme.

Overall, the findings of this study indicated that children enrolled in the KidsBright programme had experienced a significant improvement in their average ability level over time, across all areas. More importantly, improvements had been observed among those whom had started with poor initial scores in the programme – those potentially belonging to the children being most at-risk of, or already experiencing the worst effects of SpLDs. Another finding to note is the relatively large effect sizes of these improvements found provided by the KidsBright intervention, against more modest gains reported for more-conventional interventions e.g. stimulant medications (Brown et al., 2005).

The significant improvement in reading and spelling scores in particular appears noteworthy in two ways. Firstly, improving literacy score of children with dyslexia is a very challenging task, even when using the conventional phonologically-based teaching approaches as not all children respond to these approaches. It is also difficult to ensure the improvements in phonological skills would translate to more accurate or more fluent reading (Fawcett, 2013).

Secondly, the findings indicate that KidsBright is effective in improving the reading and spelling abilities of children specifically, apart from improving their cognitive abilities like attention or memory. This suggests that the KidsBright programme has an advantage over typical brain training programmes that focus on training the child's working memory; those programmes have been criticized to be limited in generalizability to bring about actual improvements to reading and spelling for the children (Pierson, 2018).

Subsequent analyses done in a test of the programme logic revealed however not all theorized aspects of the programme appeared to contribute to these improvements observed. There was no statistically significant association found between fish oil consumption with gains in scores for children with SpLDs enrolled in the KidsBright programme. However, the performance of home-based movement exercises, as facilitated by the parent, was found to have a positive role in improving many of the outcomes measured by the study. This relationship was found after having controlled for other nuisance and unmeasured factors in the programme (e.g. within-person maturation effects, through the LCGM), which would demonstrate the necessity of including home-based movement exercises as part of the service model of the programme.

At the same time, it was noted from the analysis that there had also been a significant main effect of the children having improved in all their scores, simply as they spent time in the programme. This suggested that the KidsBright programme had been effective for the most part (including ability areas where movement exercises had not shown a robust contribution), not solely because of the home movement exercises, but other factors may also have had a potential role in improving outcomes for children with SpLD as well. However, as these factors were not evaluated or controlled for in this study, their role in contributing to better outcomes for children with SpLDs remain speculative at this point without empirical evidence. These factors may include other deliberate components of the KidsBright programme e.g. mental exercises, movement exercises done in weekly sessions on ETS premises, the other two aspects of dietary approach apart from fish oil supplements, and other extra-programmatic factors e.g. ETS educational therapist effects; child maturation.

Lastly, in analysing if families had been able to comply with the demands of the KidsBright programme, it had been found that one third of parents had not abided by the home-based movement exercise dosage re

commendations by the ETS therapists – which, as suggested by other analyses in this report, has been demonstrated to be an important factor in improving outcomes. Notwithstanding that there were no significant effects found for fish oil supplementation, there also appeared to be more difficulties for families to comply with the recommended guidelines for fish oil supplementation in the programme. This could potentially be explained by way of the relatively large proportion of low-income families in the sample, whom may not have had the economic resources to access fish oil supplements as regularly.

One out of every ten children enrolled in the programme at the start had also not managed to last the six months in the programme. Hence, it could be inferred that was clear room for improvement on managing issues of service user attrition and therapeutic compliance in the programme. Doing better in these regards to ensure that children with SpLDs could receive the recommended amount of support by the families and ETS therapists would be an easy way to bring about significant, added gains for the target audience of the programme.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

It is recognized that there are certain weaknesses and limitations noticeable in this research. The consequences, and potential points presented in mitigation, about these critiques would be discussed in the following paragraphs.

Firstly, as a retrospective study without rigorous a priori designs or case controls, the rigour and quality of evidence in this report falls short of what is produced with the randomized controlled trial (RCTs) typically used to evaluate the efficacy of other therapies e.g. medication, with this client group. It may not be excluded as a logical possibility that in the absence of KidsBright, the children included in this evaluation could still have experienced the same growth in their ability areas; the gains by the children in this programme could potentially not have been to KidsBright's credit. However, it is noted that the consensus of wider literature appears to be that children with SpLD who do not receive interventions will only continue to fall further behind their peers over time in their academic abilities/abilities and achievements. Hence, it is more probable that these opposite (positive) results achieved by the children here, could be rightly attributable to the intervention that they have gone through.

However, a second critique may follow in that there were no strict controls made in this research for the possibility that children in the programme could have also been undergoing other interventions concurrent with KidsBright e.g. also undergoing neurofeedback therapy. This poses a validity threat to the research, as the intervention that they have gone through may not be KidsBright bona fide. The improvements observed may also be as a result of these other interventions and activities done in conjunction with KidsBright, rather than due to KidsBright itself. However, it is noted through anecdotal feedback from ETS therapists that this could be unlikely, as there is a practice at Care Corner ETS to discourage parents from having their children receive multiple interventions at the same time, as they could possibly be conflicting with each

other in approach. ⁶ Moreover, no measures were taken of whether or not the children were also receiving stimulant medication, because its positive effect of controlling the core symptoms is only short-term (few hours and less than a day) and core symptoms will return once the medication has worn off as indicated under the "Existing Approaches" segment.

A third critique may deal with the reliance on parent-report format to track improvements for the children in the research. However, it is noted to be common practice to collect information from parents via parent rating form for screening or assessment of children's behaviours such as ADHD (Papageorgiou, Kalyva, Dafoulis, and Vostanis, 2008). Parent rating scales are frequently used to assist in ADHD diagnosis, alongside with school teachers rating form (e.g. Conners Comprehensive Behaviour Rating Scale (CBRS)), hence this objection could be somewhat mitigated. A more pertinent threat to validity has been that the questionnaire had been administered using the same sheet of paper throughout the evaluation, with previous markings being in sight; the ratings are vulnerable to be affected by expectancy bias on the part of parents. This happens when the parents may rate the child more positively than is actually the case, due to subconsciously wanting to – (i) avoid the reality that the child has not improved despite all the money and effort invested, or (ii) avoid looking bad as they as the parent may also feel responsible or blamed if the child does not show improvement.

A fourth critique may lie in the lack of rigorous process evaluation or checks on whether the home and parental components of the programme were indeed done as they should. This has important ramifications for the study, as fish oil consumption had not been found to have a positive effect on any of the outcomes for children. As mentioned earlier, while one conclusion from this may be simply that fish oil supplements do not actually have the hypothesized effects as otherwise believed, this could be a hasty inference. A counter could be actually that there was a lack of sufficient standardization and quality control in the collection and tracking of fish oil consumption in the programme.⁷ Having not addressed this issue, it may remain as yet inconclusive as to whether or not fish oil supplements truly do not have a therapeutic role to play in improving outcomes for the child.

As such, future evaluators of KidsBright may wish to take heed of the above pointers to improve upon the state of the evaluation. While it may be difficult to expect a RCT to be done with the limited resources available, many parts of the research can be improved

^{6.} Furthermore, for pre-2013 cohorts, a majority of children had been from lower-income families. They may not have had the necessary financial resources to access other interventions concurrently.

^{7.} This includes whether even as parents may have complied with the frequency of fish oil administration as advised by Care Corner ETS, it is unclear whether they have also administered the correct dosage.

in rigour through cheaper, simpler tweaks. For instance, to re-design the forms such that the pre-tests and each re-test can be filled in on fresh sheets of paper; to collect information on more factors to aid in process evaluation; and to understand and control for the extent to which the child is pursuing other interventions at the same time as KidsBright. The programme should also be more fully evaluated, including components such as mental exercises, and other attributes and activities that are done through the span of the programme. It may be useful for a full logic model of the programme to be drafted up, which can aid in a design of such a complete evaluation.

Finally, it may also be useful to consider the use of validated outcome measurement tools, and incorporate multiple perspectives e.g. the child themselves; the therapist; teachers at school, if possible, to provide a more valid and reliable assessment of the child's changes through the programme.

PRACTICAL IMPLICATIONS

In this research, some indicative evidence was suggested for the KidsBright multimodal intervention programme to be an effective complementary intervention to conventional approaches available in the sector for children with SpLDs. In doing so, KidsBright can be said to have successfully responded to the quest of parents for effective medication-free alternatives for their children with ADHD to help them learn better in schools and in remedial teaching classes. It also answered ETS educational therapists' search for complementary interventions to help children with SpLD learn faster in remedial teaching classes.

In addition, a niche may be found for KidsBright among the landscape of services in Singapore for children with SpLD as a relatively low-cost programme, appealing to fiscally minded parents, education stakeholders and social service practitioners alike. KidsBright is typically conducted in a small group setting of 3 to 5 children, reducing the labour cost of service provision as compared to a one-to-one intervention such as neurofeedback and counselling. Further reliance on high professional labour and material costs are also reduced as the KidsBright experience has shown that it is possible to train parents to conduct regular therapy exercises at home, augmenting the therapist's efforts, to achieve the desired high frequency of activity for therapeutic effect. KidsBright also can be conducted without any special equipment (e.g. neurofeedback and sound therapy) or room (e.g. sensory integration room) requiring to be setup. Parents' costs are also reduced with lesser hours of therapist's direct intervention needed, and avoiding their need to commute to the service center with the child as often.

At the same time, this evaluation has surfaced that certain practices in the programme may need to be looked at further or strengthened, in order to deliver a more cohesive, impactful intervention to children with SpLD and their families. In the light of findings from this study, Care Corner ETS plans to improve the implementation of KidsBright programme by:

- 1. Reviewing the component of fish oil supplements in KidsBright one possibility is to make it as an optional recommendation to parents to give fish oil supplements to the children, tailoring it to the needs of each child instead of having it as a general practice; this would then need to be taken into account in the evaluation.
- 2. Revising the content of parent rating form to collect more factors to aid in process evaluation, such as how frequently mental exercises are done by the child at home, and whether the child is concurrently receiving medication or other therapies;
- 3. Establishing practical measures to work with parents and children to reduce attrition, and improve compliance on implementing home exercises. This could include the use of parent diaries to log the exercises carried out, which could be reviewed on a regular basis by ETS therapists who could help address any obstacles in their performance.
- 4. Adding objective measures of performance on standardised tests for the children at pre and post-test on at least some measures to validate the parental ratings. This would strengthen the findings considerably.

CONCLUSION

Through this research, KidsBright, a novel multi-modal intervention programme in Singapore which involves parents in implementing home-based components has been evaluated on its effectiveness on children with a range of SpLDs including ADHD, dyslexia and ASD. Findings indicated that children enrolled in this programme had experienced a significant improvement in their average ability level over time, across all 10 areas evaluated, based on parental ratings: (i) Reading; (ii) Spelling; (iii) Handwriting; (iv) Verbal Skill; (v) Concentration; (vi) Ability to Sit Still; (vii) Memory; (viii) Motor Coordination; (ix) Social Interaction; (x) Mathematics.

The home-based movement exercise modality of the programme was found to be effective in improving many ability domains, while no evidence was found for fish oil supplementation modality to contribute to any improvements for children. The results also suggested that issues of service user attrition and their compliance to programme requirements may also need to be worked on in order for the programme to be more effective. In terms of practical implications, the evidence suggests that this programme could be an effective complementary intervention to conventional approaches for helping children with SpLDs. For children with ADHD, this programme may be considered as an effective, medication-free alternative to help them learn better. For children with other SpLDs, it could serve as an effective complementary intervention to help them to learn faster in remedial teaching classes.

Care Corner ETS plans to continue improving the KidsBright programme, and extending it to more parents and educators to help more children with SpLDs reach their fullest potential in learning and academic achievement. This will in turn help level up the educational outcome for these children, who constitute a significant portion of each cohort of students in Singapore.

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ANNEX A: PARENT RATING FORM FOR REFERENCE



KidsBright Programme Parent Rating Scale 家长评估 指表

Please rate each item below according to your child's current ability and behaviour. 请根 据孩子现有的能力 和表现, 在项目 1 至 10 的栏目上进行评估。

1	2	3	4			5		U	[
Very Weak	Moderately Weak	Marginally Weak	Acceptable/A	verage		Good		Uns	ure
非常弱	弱	稍微弱	没问题			好		不清	i楚
1. Reading (Ability t	认字/阅读能力 o recognise/understand	l words for child's age	group)	1	2	3	4	5	U
2. Spelling [(Ability t	听写能力 o leam spelling)			1	2	3	4	5	U
3. Handwrit (Ability t	ing 写字能力 o write neatly)			1	2	3	4	5	U
4. Verbal sk (Includes	ill (talking) 口语(说 pronunciation and exp	话)能力 pression of ideas)		1	2	3	4	5	U
5. Concentra (Ability to	ation 注意力 o focus on task)			1	2	3	4	5	U
6. Ability to	sit still 能安静的坐			1	2	3	4	5	U
7. Memory (Ability t	记忆力 o remember things we	II)		1	2	3	4	5	U
8. Motor coo (Poor moto leg mover 困难如:	1	2	3	4	5	U			
9. Social Inte (Ability to Social int	eraction 社交能力有 relate to people e.g. h eraction ability)	交朋友的能力 aving no friends indic	ates poor	1	2	3	4	5	U
10. Math 数: (Ability t	学能力(能明白数学 ounderstand math con	的概念) cepts for child's age g	roup)	1	2	3	4	5	U
Following 2	items are to be fille	d up only at subsequ	ient <u>p</u> arent train	ing ses.	sion.	<u>s: -</u>			
*Movement No. of time	Exercises (Home) 胞 s done weekly (on a	前部激发运动 verage)	0	1	2	3	4	5	6
*Fish Oil Su No. of time	pplement 鱼油补充: s taken weekly (on a	剂 werage)	0	1	2	3	4	5	6

Child's Name 孩子姓名:	Parent's Name 父母姓名:
(1) 1 st Rating Date (第一次评估日期)	use a circle 进行评估时以 园圈 为符号 〇
(2) 2 nd Rating Date (第二次评估日期)	use a square 进行评估时以 正方形 为符号
(3) 3 rd Rating Date (第三次评估日期)	use a triangle 进行评估时以 <u>三角</u> 形为符号 🛆

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The role of Mindfulness and Positive Psychology interventions in job crafting for educators: A diagnostic and prescriptive approach to supporting educators through Mindfulness and Positive Psychology during a crisis.

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1. Dyslexia Association of Singapore

Abstract

Work is enormously important in our lives, not only because it takes up about half of our waking time, or provides us with a means of existence, but also because of the psychological impact that it has (Boniwell, 2011). As such, well-being at the workplace has become a primary feature in many organisations. The encouraging results from the growing body of research in Mindfulness and positive psychology have been pivotal in encouraging the DAS to enrich their approach towards wellness for Educators significantly, through CalmEd, a well-being initiative. A recent training for Educational Advisors inspired by Mindfulness-Based Interventions (MBI) and positive psychology, saw the result of 57% who felt that they were starting to develop mindfulness practices more consistently and 43% found themselves to be reaching a good proficiency towards the end of 11 months of training. Additionally, from the latest follow-up survey during the Co-Vid 19 pandemic, 100% were more aware of having to practice Mindfulness during a crisis, and 60% were able to practice composure during this time. The training intended to improve the responsibility towards well-being of self, and innovatively improve their approach towards work through job crafting.

Keywords: Mindfulness, Positive Psychology, Job Crafting, Educational Therapists, Well-being

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INTRODUCTION

As educators, we are members of the 'caring professions'- a group that includes doctors, nurses and social workers. We give a lot: we invest our time and energy in our work, and we offer something personal of ourselves to our students. This may often feel rewarding and motivating, but over time, we may also be in danger of burnout (Hawkins, 2017). Educators encounter occupational stressors unique to their profession, such as teaching challenging students, managing the classroom environment, dealing with pressures from parents, and responding to student crises (Kyriacou, 2001; Friedman, 2000; van Dick and Wagner, 2001). These demands can result in burnout, the depletion of physical and emotional energy resulting from working conditions (Maslach et al., 2001). Like a virus, burnout has a potentiality damaging impact on its host environment and the cells with which it comes into contact: the educator experiencing it, their students, and their colleagues.

Special Education teachers, in particular, are at high risk for burnout as their working conditions align with many of the factors associated with burnout. Research has shown that Special Education Needs (SEN) teachers like DAS Educational Therapists are at a higher risk of burnout when compared with other professionals. The Dyslexia Association of Singapore (DAS) is a non-profit organisation that is part funded by the Ministry of Education and the National Council of Social Service. It has 14 learning centres across Singapore from which it supports over 4000 students through its programmes and the 155 Educational Therapists it hires (Ram and Samsudin, 2019). One of the most critical challenges in the field of special education is developing a competent workforce and creating work environments that sustain special educators; involvement, passion and commitment. This is especially true on many different levels at the DAS educational front; the new teachers, acclimatised teachers, and the allies of quality education, the Educational Advisors. This study focuses on influencing and refining the well-being and job crafting approaches of the DAS Educational Advisors to advocate the need for healthy and good workplace practices amongst the Educational Therapists they are frequently in contact with.

In order to facilitate this approach, the Staff Professional Development(SPD) adopted CalmEd, a well-being initiative developed to ensure the well-being of educators while promoting a positive working environment. CalmEd (Calm Education) is a Mindfulness-Based Intervention and Positive Psychology based well-being initiative to address and encourage wellness at the workplace and heighten the importance of responsibility towards self-care. DAS Educators, especially those having to deal with a range of challenges within the scope of Special Educational Needs, are in danger of burning out faster due to the intricacies of the teaching approaches (Ram and Samsudin, 2019). CalmEd has also adopted positive psychology's tenets to demonstrate the levels of practice better; including subjective, individual and community/group. Ideally, one needs to nurture personal practice to make sense of Mindfulness and its constitutions,

and employ the approach when dealing with various subjects to understand the impact it has on the community, in this case, the organisation.

Mindfulness practices offer a promising approach to investing in school personnel by providing them with tools to cope with stress (Roeser et al., 2012). Mindfulness features two key components: the ability to regulate one's attention and orientation to one's experience that is open and curious (Bishop et al., 2004). One of the benefits of practising a positive psychological outlook is, to put it broadly, success! Not only does success make us happier, feeling happy and experiencing positive emotions increases our chances of success (Lyubomirsky, King, and Diener, 2005).

Positive psychology in the name of its founder, Martin Seligman, is defined as the scientific study of optimal human functioning that aims to discover and promote the factors that allow individuals and communities to thrive (Seligman and Csikszentmihalyi, 2000). Positive psychology is "the scientific study of what makes life most worth living," according to psychologist Peterson (2008, para. 4). The science of positive psychology operates on three different levels- the subjective level, the individual level and the group level (Boniwell, 2011).

- The subjective level includes the study of positive experiences such as joy, well-being, satisfaction, contentment, happiness, optimism and flow. This level is about feeling good, rather than doing good or being a good person.
- 2. The Individual level, the aim is to identify the constituents of the 'good life' and the personal qualities that are necessary for being a 'good person', through studying human strengths and virtues, future-mindedness, capacity for love, courage, perseverance, forgiveness, originality, wisdom, interpersonal skills and giftedness.
- 3. The group or community level, the emphasis is on civic virtues, social responsibilities, nurturance, altruism, civility, tolerance, work ethics, positive institutions and other factors that contribute to the development of citizenship and communities.

In order to create conditions through the resourcefulness of MBI and Positive Psychology based approaches, there must be great awareness and attention to the challenges we need to address. To master this, we need Mindfulness as the undercurrent.

The close ties between Mindfulness and positive psychology make sense when you consider the outcomes of Mindfulness: increased positivity, a greater sense of coherence, better quality of life, more empathy, more satisfying relationships, and greater hope (Vago and Silbersweig, 2012).

	EDUCATIONAL THERAPIST	EDUCATIONAL ADVISOR
TEACHING	 Lesson execution (Group of 4-5) Lesson planning and developing resources Periodic review of goals and intervention plans **Certain classes require differentiated instruction 	 Lesson execution (Group of 4-5) Lesson planning and developing resources Periodic review of goals and intervention plans **Certain classes require differentiated instruction
PROGRESS MONITORING	 Conducting Curriculum Based Assessments (CBAs) twice a year Analysis and grading of the CBAs Monitoring the academic progress of the students 	 Conducting Curriculum Based Assessments (CBAs) twice a year Analysis and grading of the CBAs Monitoring the academic progress of the students Development and enhancement of CBAs
ADMINISTRATIVE	 Writing semestral Progress Reports Writing of monthly communication Biennial submission of Request for Extension (RfEs) for students who have completed 48 months of intervention Writing annual peer observation reports 	 Writing semestral Progress Reports Sampling and feedback of semestral progress reports Writing of monthly communication Biennial submission of Request for Extension (RfEs) for students who have completed 48 months of intervention Checking of Interviewee Scripts Writing observation reports - broad- based, peer and Intensive Remediation (IR)
COMMUNICATION	 Conducting Meet-the-Parents (MTP) sessions held at the end of each semester (twice a year) Monthly communication with parents on student's learning progress 	 Conducting Meet-the-Parents (MTP) sessions held at the end of each semester (twice a year) Monthly communication with parents on student's learning progress Logging of tutorials with EdTs Logging the termly Centre Management Team (CMT) meetings
COACHING AND MENTORING	 Supporting trainee EdTs during their initial on job training 	 Mentoring trainee EdTs during their Applied Educational Therapy (AET) Module Supporting EdTs at our attached learning centres

Table 1: Educational Therapists and Educational Advisors Job Role Responsibilities

	EDUCATIONAL THERAPIST	EDUCATIONAL ADVISOR
CONTINUED PROFESSIONAL DEVELOPMENT	 Achieving a minimum 50 hours of professional development training Attending/presenting at the annual Teams Teaching Teams (TTT) event Attending/presenting at the annual organisation's seminars and conferences Attaining a dual specialisation* (teaching a 2nd programme) *May not apply to all EdTs 	 Achieving a minimum 50 hours of professional development training Attending/presenting/supporting at the annual Teams Teaching Teams (TTT) event Attending and/or presenting at Local/ International conferences Individual or group contribution to organisation's publications (academic/non-academic)
TRAINING	 Conducting termly Educational Technology based sharing* *May not apply to all EdTs 	 Conducting initial on job training module lectures Conducting AET module lectures Conducting Centre Sharing on administrative and educational matters
QUALITY ASSURANCE	 Undergo annual Quality Assurance Audits (QAAs) 	 Undergo annual QAAs Conducting annual educational QAAs for EdTs Conducting annual performance appraisals for EdTs Initial on job training formal observations AET Informal and Formal Observations
SUPPORT	 ◆ Centre welfare support 	 Supportive observations - broad- based, peer and Intensive Remediation (IR) Participation in Lesson Studies for new programmes under English Language and Literacy (ELL)
MISCELLANEOUS	 Being engaged in curriculum and resource design and development, action research and lesson studies* Being involved in the conduct of awareness talks, workshops, parent support group (PSG) talks* *May not apply to all EdTs 	 Interviewee phonics testing Weekly Advisory Team meetings Being involved in the conduct of awareness talks, workshops, parent support group (PSG) talks

Table 1: Educational Therapists and Educational Advisors Job Role Responsibilities (cont')

Having to manage the requirements of their roles as Educational Therapist and Educational Advisors (Table 1) which include, providing phonics intervention, managing classroom climate, and administrative responsibilities, Educational Advisors (in the case of DAS) are highly vulnerable to the effects of burnout and require effective and holistic resources like Mindfulness-Based Interventions and Positive Psychology based approaches to evaluate, recalibrate and craft their approach in an emotionally and psychologically demanding profession. This will also allow them to organise and manage challenges of juggling two roles, before making themselves amply available to the other Educational Therapists.

Mindfulness practices taught in the CalmEd programme are similar to those recruited in other evidence-based MBIs which include breath-work, gentle movement, meditation and awareness training. The elements of the CalmEd training framework diligently included meditation, theory, mindfulness-practice-related quizzes and surveys to concretise knowledge and practical exercise sessions to make connections to personal and workrelated scenarios where MBI and positive psychology can be applied. CalmEd also went beyond other Mindfulness-Based Interventions and is designed to specifically address the occupational challenges unique to DAS Educational Advisors.

The intention of this study was to understand how Mindfulness-Based Intervention combined with the science of positive psychology-based interventions can guide and help Educators in job crafting, so that they can flourish and build resilience whilst not compromising their well-being. We define job crafting as the physical and cognitive changes individuals make in the task or relational boundaries of their work. Thus, job crafting is an action, and those who undertake it are job crafters. Job crafting is a creative and improvised process that captures how individuals locally adapt their jobs in ways that create and sustain a viable definition of the work they do and who they are at work (Wrzesniewski and Dutton, 2001).

Mindfulness

Mindfulness has been defined as 'paying attention in a particular way: on purpose, in the present moment and non-judgmentally' (Kabat-Zinn, 1994, p.4). A considerable body of evidence with adult populations indicates that Mindfulness, a particular way of deploying attention and awareness in the present moment, without emotional reaction or conceptual judgment, is instrumental in helping adults reduce stress, regulate emotion, and thereby improve their health and well-being (Carmody and Baer, 2008; Grossman, Niemann, Schmidt, and Walach, 2004). In this sense, Mindfulness is viewed as a state and not a trait, and while certain practices or activities might promote it (e.g. meditation), it is not equivalent to or synonymous with them. A state is a temporary way of being (i.e., thinking, feeling, behaving, and relating) while a trait tends to be a more stable and enduring characteristic or pattern of behaviour (Lazarus, 2017, para. 3). State and traits are relative. From a mindfulness point of view, our state can change and
improve if we exercise healthy traits to manage change. This requires us to shift perspectives. According to the Dalai Lama, 'the ability to look at events from different perspectives can be very helpful. One must realise that every phenomenon, every event, has different aspects. Everything is relative in nature' (Cutler and Gyatso, (H. H. the XIVth Dalai Lama), 1998, p.143).

Mindfulness has similarities to other psychotherapy-related constructs. For example, Mindfulness is similar to mentalisation (Bateman and Fonagy, 2004, 2006; Fonagy and Bateman, 2008), the developmental process of understanding one's own and others' behaviour in terms of individuals' thoughts, feelings, and desires. Both constructs emphasise the temporary, subjective, and fluid nature of mental states and both are thought to enhance regulation of affect and cognitive flexibility (Wallin, 2007). In essence, Mindfulness helps an individual create space for thoughts to be processed and observed mindfully and avoids impulsive reactions that may have negative implications and outcomes. In the words of Viktor Frankl, the Austrian neurologist, "between stimulus and response, there is a space. In that space is our power to choose our response. In our response lies our growth and our freedom" (Frankl, 1946).

Figure 1 and 2 demonstrate the power of space and how it gives us an opportunity to analyse a situation, compose and recalibrate. Mindfulness can take you out of your habitual thinking by bringing you to what is actually happening at the present time.



This foundational technique of learning Mindfulness is tremendously helpful for working with challenging thoughts, emotions, and experiences (Boyce, 2011). According to Boyce, reactivity means responding to stimuli in the world in ways that induce unnecessary stress. For instance, when you are verbally attacked, you may respond automatically, both physically and mentally. By practising present-time awareness, even in the midst of a difficult situation, you can become aware of your impulses (your reactive patterns), stop, perhaps take a breath, and respond skilfully in a way that does not lead to more harm.

The first thing we need to realise about stress is that it doesn't do a good job of classifying problems (Shetty, 2020). We need a level of composure to manage stress, fear, anxiety or burnout. We need to understand the value that a negative response brings into our lives and how it affects our well-being. We must be willing to change our relationship with negative responses. In order for a shift and reframing to happen, we must master Mindfulness to identify our automatic patterns and besides, also go on to find the opportunities to learn in any given situation, especially challenging ones. This is another way to train our responses.

Space is no longer something distinct from matter; it is one of the 'material' components of the world (Rovelli, 2016). Space is essential for us to create and use, especially in a potentially precarious mental and physical environment.

Mindfulness and the Brain

It is important to understand the positive impact that Mindfulness can have on the brain. A body of research linking Mindfulness and the brain has found increased neurogenesis (creation of new neurons) and grey matter (generation of new nerve cells in the brain). This reflects essentially the reversing of ageing; meditators' brains often appear younger than their non-meditating counterparts. This occurs in the brain's frontal cortex (the part of the brain associated with decision-making and logical thinking) and the sensory cortices (the part of the brain associated with sensing, feeling, noticing), as well as the hippocampal formation (the part of the brain's natural tendency to thin (Treadway and Lazar, 2009), especially in the anterior cingulate (the part of the brain associated with attention), the insula (the part of the brain associated with gut-responding), as well as decreased activity and reduced grey matter in the amygdala (the part of the brain associated with fear) (Linder, 2019).

Mindfulness also supports neuroplasticity. We have seen that Mindfulness can be very beneficial because it not only helps us to cope better; it also helps our brains to function better. Neuroplasticity allows the brain to reorganise itself. It does this by forming new neural connections throughout our life, a process that continues throughout adulthood. Evidence shows us that Mindfulness can help increase our resilience, which allows us to

cope better and to roll with the punches. By applying neuroplasticity, you can essentially "re-wire" and "hardwire" the brain helping you to achieve greater levels of peace, health, happiness, and joy (Riopel, 2020). The research findings of Tang and his colleagues show that mindfulness training groups that completed a 3-hour mindfulness practice session have higher activity in the ACC, (the little corner of our brain that is relevant to resilience is a region called the anterior cingulate cortex) and also show higher performance on tests of self-regulation and resisting distractors, compared to the control group (Tang et al., 2007; 2009).

This means that with just a small commitment to practising Mindfulness, we can change the way our brain reacts to setbacks and improve our ability to make smart decisions. This has also been an inspiration and a catalyst in facing challenging situations at work and the consequences of a pandemic like COVID-19.

Job Crafting

Job crafting is about taking proactive steps and actions to redesign what we do at work, essentially changing tasks, relationships, and perceptions of our jobs (Berg et al., 2007). So through the techniques and approaches that we will look at in this article, we 'craft' ourselves a job that we love (Moore, 2020). One where we can still satisfy and excel in our functions, but which is simultaneously more aligned with our strengths, motives, and passions (Wrzesniewski et al., 2010). Unsurprisingly, it has been linked to better performance (Caldwell and O'Reilly, 1990), intrinsic motivation, and employee engagement (Dubbelt et al., 2019; Halbesleben, 2010). The very act of shaping one's own job is beneficial, according to Frese and Fay (2001). Altering the way, we see and engage with our jobs can give us a sense of control over what the tasks do, as well as more fulfilment from the connections we make (Wrzesniewski and Dutton, 2001). Basically, we have more resources at our disposal, which is intrinsically motivating-it facilitates personal growth and helps us to accomplish our goals (Halbesleben, 2010). In a study by Slemp and Vella-Broderick (2013), the degree of job crafting that employees got involved with was linked to how well their psychological and subjective well-being needs were satisfied.

There are three layers that sets the structure of job crafting; task crafting, relational crafting and cognitive crafting. Task crafting involves employees altering the set of responsibilities prescribed by a formal job description, by adding or dropping tasks, altering the nature of tasks, energy, and attention are allocated to various tasks (e.g., lesson planning and gathering resources) Relational crafting involves changing how, when, or with whom employees interact with in the execution of their jobs (e.g., Educational Advisors forming rapport with Educational Therapists and vice-versa). And finally, cognitive crafting involves employees changing the way they perceive the tasks and relationships that make up their jobs (e.g. transitioning from face-to-face classes onto digital classrooms and reframing mind-set).

Through using any combination of these three types of job crafting techniques, employees become job crafters, altering the boundaries of their jobs in ways that change how they experience the meaningfulness of their work (Fried, Grant, Levi, Hadani and Slowik, 2007). Meaningful work refers to work that is perceived as significant and valuable to an individual (Michaelson, Pratt, Grant, and Dunn, 2013). Earlier research by Hansen (1995) indicated that viewing ones job as meaningful can spark teacher's resilience with determination and flexibility.

Teaching is a demanding profession in this era of 'change' since teachers are expected to exhibit new skills and dispositions that fit with the developments, which include; problem-solving abilities, technology, collaboration and communication skills (Bajunid, 2006).

When one feels engaged at work, he or she will be more inclined to increase their job resources and job demands, to create a better suiting and more challenging work environment (Tims, Bakker, and Derks, 2012). This proactive behaviour by which employees create changes in their work environment and the way they work, is also known as job crafting (Grant and Parker, 2009). The outcomes of a study by Lu, Wang, Lu, Du and Bakker(2014), indicated that engaged employees craft their work in physical and relational ways, which helps them to create and/or maintain a good fit between their job and their own talents, passions and preferences at work. Consequently, job crafting can be seen as a strategic advantage one may apply during times of change.

Job crafting is not an isolated, one-time event. On the contrary, job crafting is a continuous process that is likely influenced by where employees are in their career trajectories (Fried, Grant, Levi, Hadani and Slowik, 2007) and the social context in which they do their work (Berg, Wrzesniewski and Dutton, 2010).





In relation to the CalmEd, MBI and positive psychology-based training, this proved to be pivotal in the participants identifying areas they needed to refine in their respective job roles. They were able to break down the necessary steps through brainstorming and restructuring sessions that encouraged cognitive crafting, inspired by Mindfulness and positive psychology practice, relational crafting through collective discussions and finally task crafting by coming together as a team to filter unwanted or energy draining tasks out of the frame, by understanding and breaking down how they could restructure the approach to perceived challenges by Educational Therapists.

This was done through the spontaneous efforts of the Educational Advisors in efforts to support the Educational Therapists during the COVID-19 pandemic (for the changing needs, see table 3).

METHOD

Participants

The participants in this study were selected by criterion sampling, which focuses on the selection of information-rich cases based upon some criterion deemed important (Patton 2002). Participants were drawn from the Educational Advisory team who are the primary mentors to Educational Therapists at DAS, considering also the impact their work has on the quality of Education at the organisation. Eight Educational Advisors who are assigned to oversee the educational front of 14 Learning Centres were the main participants of this study. The research was designed to establish whether or not they also demonstrated positive change following the intervention from the present study. Participants in this study had 6 - 15 years of teaching experience and ranged in age from 29–53 years.

Ethical Considerations

Ethical considerations have been put in place right from the point of the initial observation stages and development of this case study. Research participants will not be subjected to harm in any ways whatsoever. Participants' dignity will be prioritised at all times, and full consent was obtained from the participants prior to surveys and interviews. The anonymity of individuals participating in the research will be ensured. Any deception or exaggeration about the aims and objectives of the research will be avoided. Any type of communication in relation to the research will be done with honesty and transparency. The emotional and mental well-being of the participants will be taken very seriously as this research has the involvement of mental and emotional aspects. The results of this research will be independent and impartial, and it will be shared with the participants.

All ethics will adhere to the following, Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research, Report of the National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research (1979) and the Singapore Statement of Research Integrity (2010).

Research Design

The research is supported by three stages of the CalmEd training:

- 1. Priming,
- 2. Contextualising and
- 3. Conceptualising.

The priming stage prepares and creates conditions for our Educational Advisors to experience mindfulness-based activities like meditation or a quiet moment to gather their thoughts and self-regulate before a lecture. This also allows them to approach new topics and themes with an explorative mind. This is parallel to the individual level in positive psychology where one practises for themselves before diversifying further.

The contextualising stage encourages Educational Advisors to apply their knowledge through quizzes and surveys, and bridge the connection between mindfulness concepts and potential emotional and mental challenges they may have faced at work due to the lack of resources to manage. It also helps them connect with the social and emotional aspect of their lives and the depth of its impact. This also helps them identify relevance between response and stimulus and break down the importance of rationing their energy accordingly.

Finally, the conceptualising stage paves opportunities for the team of Educational Advisors to come together after drawing parallels to their experiences at work, and reflect on situations they felt an aspect of the mindfulness they had explored could come in handy. This was done in a collective fashion to support team building and sharing of diverse expertise.

CalmEd training model reflects these stages to facilitate job crafting. The training integrated the expertise of Mindfulness X for the theory content, and the Calm app in the second month of the training in term 1 for meditation during the priming process. Incidentally, it has also guided the structure of this study for systematic understanding of the training design and how it has seeped into efforts of enriching the working experience of educators at DAS. Considering the nature of the topic of study being Mindfulness and that it is intensively contemplative, the data is chiefly qualitative and has assumed approaches like textual mining to identify, themes such as emotions, level of awareness and administration of applying knowledge.

Participant observation of CalmEd training, as well as interviews/surveys, informed the development of interview questions (Glesne, 2006; Patton, 2002). Surveys were conducted over three terms; 1) midterm 2019 and end of the year 2019 evaluating the learning outcome from mindfulness training and how it can be utilised in job crafting and 2) during the COVID-19 lockdown period April-June 2020 which gathered responses as to how Mindfulness came into play during a crisis.

The following questions were used to guide the surveys in 2019:

- 1. Define Mindfulness
- 2. To what extent have you been able to apply Mindfulness into your personal life post CalmEd?
- 3. How have you been able to integrate Mindfulness into work?
- 4. Using the SOLO taxonomy learning rubric, evaluate your level of progress in this training.

The SOLO Taxonomy (Structure of the Observed Learning Outcome) focuses on the approaches, methodologies, and techniques employed in the valuation of the quality of learning. (Biggs, Collis and Edward, 2014). SOLO is a developmental schema of classifying learning outcomes in terms of their complexity, thus enabling instructors to assess students' work in terms of its quality, not of how many responses in a particular subject task or activity are correct (Chan et al., 2002). The SOLO taxonomy provides criteria that identify the levels of increasing complexity of students' performance for understanding when mastering new learning (Biggs, 1999). SOLO can be used not only in assessment but also in designing the curriculum in terms of the learning outcomes intended. The Structure of Observed Learning Outcomes (SOLO) taxonomy is a useful way to think about assessment criteria (Biggs and Tang, 2011). This taxonomy includes five levels of performance which are described as follows in Figure 4 below:



Figure 4. The SOLO taxonomy. Adapted from Biggs and Collis (1982)

Adapting the SOLO taxonomy, a simplified schema categorised as a) Novice, b) Developing and c) Proficient was created for the Educational Advisors to utilise when assessing their learning outcome.

Using the learning outcome rubric as a guide, evaluate your level of progress in drawing the connection between work and mindfulness concepts.

SELF- EVALUATION CRITERIA	NOVICE Aware of Self-Evaluation	DEVELOPING Relational Strategies of Evaluation	PROFICIENT Extended Abstract- Reflective Self Evaluation
LEVEL 1: Work with Trainer	l can describe the stages of my self- evaluation	l can describe and explain the stages of my learning process	I can describe, explain, evaluate and reflect on the stages of my learning process
LEVEL 2: Outcomes from Practicums	What I did?	What I did and why I did it?	What I did, why I did it and how it went and what I would change the next time.
LEVEL 3: Using Learning Outcomes from Practicums	l can describe my learning outcome and different stages of learning process My learning outcome	I can describe and explain my learning outcome and different stages of learning process My learning outcome and why I think my learning outcome is a this Level?	I can describe, explain and evaluate my learning outcome and different stages of learning process. My learning outcome, why I think my learning outcome is at this level and how well I have achieved this level.

Table 2: CalmEd Learning Rubric Assessment

The following questions were used to guide the surveys in 2020 during Pandemic:

- 1. Since completing the CalmEd Mindfulness training in 2019, how did you intend to apply the knowledge? List 3 work-related aspects you felt could be improved through mindfulness-based approaches.
- 2. What were some limitations you experienced where the application of mindfulness-based approaches in work-related situations was concerned? Please give at least 1 example of such a situation.
- Since becoming aware of the COVID-19 Pandemic earlier this year, share one word/phrase that best describes your feelings or thoughts. Your response can be organised respectively to 1. Feelings and 2. Thoughts.
- 4. To what extent did the pandemic affect your daily routine?
- 5. If there were some skills you wish you were equipped with to manage challenges, especially during the pandemic-mindfulness-based or not, what would these skills be?

Data Analyses

Surveys were conducted over three terms; 1) midterm 2019 and end of the year 2019 evaluating the learning outcome from mindfulness training and how it can be utilised in job crafting and 2) during the COVID-19 lockdown period April-June 2020 which gathered responses as to how Mindfulness came into play during a crisis. Survey responses were analysed via inductive thematic analysis; therefore, themes were developed without attempting to fit them into a predetermined framework (Braun and Clarke, 2006). Braun and Clarke (2006) identified six phases in thematic analysis:

- 1. familiarising yourself with the data,
- 2. generalising initial codes,
- 3. searching for themes,
- 4. reviewing themes,
- 5. defining themes, and
- 6. producing the report.

Braun and Clarke's (2006) template for thematic analysis was selected because it is userfriendly and has been used by other mindfulness researchers in the fields of education and counselling (e.g., McCollum and Gehart 2010).

RESULTS

Each Educational Advisor had a unique account of how she applied knowledge from CalmEd in everyday life. Despite this, there were distinct and collective patterns noticed across the Educational Advisors. The key patterns that emerged were their tendency to discuss CalmEd strategies they used, the ways in which their mind-sets have shifted as a result of CalmEd, and examples of how they have integrated their learning at work, with colleagues and outside of DAS.

A growing sense of awareness was observed amongst the Educational Advisors and an evident attunement towards employing breathing techniques and pausing to stabilise and compose themselves during a challenging situation. The demonstration of sharing specific experiences in line with the contemplative practice used personally and professionally goes to prove that the knowledge is present, grasp is evident but also pragmatically shows the importance of articulating more ardently during a situation like this pandemic to change the narrative or experience a mind-set shift. This is also a feature of dispositional Mindfulness, also known as trait mindfulness. Dispositional Mindfulness has been found to occur at varying levels within the population, irrespective of mindfulness practice (Brown et al., 2007; Kabat-Zinn, 1990). It has been found that regular mindfulness practice can lead to an increase in the baseline of the trait (Quaglia et al., 2016), indicating that Mindfulness-Based Interventions also have the potential to deliver more than just short-term state changes. In recent years, there has been an increase in research exploring the potential that DM (Dispositional Mindfulness) may have in enhancing psychological health within the general population.

Here, it is evident that participants are in the process of both understanding and applying the concept of job crafting. This also allows them to refine the unique nature of their jobs.

How effective have the practicum sessions been in identifying areas of your job scope which needs refining?





Job crafting requires a sharp sense of awareness especially if one is trying to identify areas in their job which have potential to be refined, for a better work experience. Have the job crafting experience sharpened your level of awareness?



Figure 5. The connection between mindful awareness and refining work processes





Figure 6.: Experience with Job crafting

Do you feel that job crafting activities can reduce workrelated ailments like stress, burnout and anxiety? If yes or no, proceed to further explain your choice with at least three points of justification.

"Yes. Job crafting can allow for the above to happen as it guides you to consider and allocate your work based on the weightage of it, the energy you'll spend on it and the resources needed to complete it. Firstly, it is directly in line with our organisational skills and with better organisation, we will be able to manage our stress levels and burnout better. Next, it motivates us to create an action plan that sets better goals and ration our time and energy in a more productive manner. Finally, it is a beneficial as it gives us the opportunity to consciously consider what our strengths and weaknesses are and to work towards maximising our strengths to help us manage and function better at work."

"Yes, I strongly believe that job-crafting with superiors that are open enough to allow the enhancements to the job-scope to occur can be very beneficial in making work more meaningful while reducing stress and burnout."

"Depends. Job crafting activities should not just be a pen and paper activity; while thoughts have been put into it, I believe that more actions should be put in place to make it happen."

"Yes. Job crafting allows us to identify the areas we want to work on and further develop the skills we need. Hence, this lead to more job satisfaction and lower anxiety, stress and burnout. People will feel less tired and more motivated."

Figure 7. Role of job crafting in combating mental health related ailments

Calm Meditation App for Educators

The Calm App is an app available to download on your mobile phone, tablets and laptops. It is filled with innumerable meditation practices, sleep stories and soundscapes that are written and recorded by some of the top experts in various fields. Calm goes above and beyond just being a meditation app. They have uniquely designed meditation sessions for a range of emotions and challenges a human being may experience in their lifetime. This includes sessions for children and teenagers too. Calm also has sessions for how to train your mind to focus, by world-leading athletes and other field experts. Additionally, Calm had a free subscription scheme for 1 million educators around the world for a limited period. This also was an opportunity for the Educational Therapist at DAS to sign up for Calm for use outside of work and in-class.

Calm App Guided Meditation Practices: Do you feel that the guided meditation has made meditation more accessible and approachable?



Figure 8. Approach to meditation through accessible resources: Calm App

Mindfulness X (Mindfulness-Based Intervention Trainer Programme)

Mindfulness X was created by a qualified psychologist and researcher Dr Hugo Alberts who has been exploring the practical and scientific side of Mindfulness through controlled lab and field studies for the past 12 years. To date, he's published over 20 articles for academia on this topic and in a previous role he was Associate Professor at the University of Maastricht. He has been a sought-after trainer in Mindfulness for many years, and in 2010 Hugo developed the Mindfulness X training course as his methodology for training other practitioners. He's now offering Mindfulness X to other practitioners in order to increase the number of people he can help through the positive impact of Mindfulness (Positive Psychology). This approach was also adopted at DAS.

- 1. Attention and The Now cultivating attention to the present moment
- 2. Automaticity exploring the automatic nature of thoughts
- 3. Judgment exploring the judgmental nature of mind
- 4. Acceptance applying acceptance to difficult emotions
- 5. Goals finding a balance between being in the present moment and planning for the future
- 6. Compassion effectively cultivating a friendly and caring relationship with the self
- 7. The ego defining the difference between the self as a story and the self as an observer
- 8. Integration integrating Mindfulness into daily life
- 9. Formal Meditation
- 10. Meditation Troubleshooting

Three weeks were dedicated to each topic where the first two weeks were spent first understanding the concept and the following week devoted to practical integration where participants identified ways they could integrate mindfulness-based concepts into a work related situation. Here, the development of positive psychology took effect as participants started exploring focusing on the strengths more than weaknesses during collective brainstorming sessions (readers are advised to refer back to Table 4 for further details).

To push this brief description a bit further, positive psychology is a scientific approach to studying human thoughts, feelings, and behaviour, with a focus on strengths instead of weaknesses, building the good in life instead of repairing the bad, and taking the lives of average people up to "great" instead of focusing solely on moving those who are struggling up to "normal" (Peterson, 2008).

During these integration sessions, Educational Advisors were given the opportunities to attempt quizzes, surveys and organised brainstorming sessions which led to presentations. Each topic paved the way to identify opportunities to integrate Mindfulness into their day to day lives. Additionally, All Educational Advisors were given Gratitude Journals curated by the trainer considering time, effort and ease of accessibility (Figures 6 and 7). The gratitude journal was also pivotal in encouraging the participants to get into the habit of reminding themselves of the goodness and positivity that surrounds them, especially during hectic school terms. The outcome of the benefits of this journal was designed to be anecdotal in order to keep the practice organic and not frame it for statistical scrutiny. Over the course of the 11 months, Educational Advisors were regularly asked to share their experience with their gratitude journal and how it has brought about emotional and psychological changes.



Figure 9. CalmEd Training design and delivery



A Mindful Effort



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Date: / / /
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3 things I'm grateful for
Naking up and being able is
2. For my loved ones and friends
3. For another opportunity. Today's Intention:
To take a breath before repaying
11 make today GREAT by
1. Smiling more
2. Journalling
3. Exercising
The day was generally great but
I was too fired to exercise. Would
have been a tad-bit better if!
chied. 3 lovely thinks that haranemed tasks
1. I made a hearty breakfast.
2 My friend from France called in B
3. I remembered to take a breath
· wording
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3. Waking up to another day for
work and creating things.
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3. I morde dinner for my family

Figure 11. Representation of original journal entries

Crisis: COVID-19 Pandemic and Impact

The pandemic has caused unparalleled disruptions to many industries and the lives of many people. One of them to take the greatest hit is the education industry. The pandemic has caused school closures in many countries and caused interference to the learning of many students. In order to ensure the continuity of education, educators all over the world had to rethink and reinvent their ways of teaching within a short span of time. DAS was one such organisation impacted by the pandemic. Like everyone else, we had to rise to the new challenges presented to us and ensure continuity in service. DAS was prepared for what was to come through arranging for personalised e-mail accounts for students and giving educators the lead time to share e-mail details with their students should a lockdown scenario take effect. This is also part of taking into consideration that educators don't struggle when the actual home-based learning takes place.

The educators at DAS were made to reimagine the way they would deliver their lessons and create effective lessons for their students with special learning needs. The Educational Advisors had to rethink ways to provide support to the educators to ensure that effective learning takes place without compromising the quality of teaching and learning. This also included measuring the effectiveness of instructional guidance and refining their instructions simultaneously. Humanity is in a period of great upheaval. For people and organisations attempting to thrive in these tumultuous times, old mindsets and approaches no longer work. To create a better future where everyone can flourish, leaders and organisations need to find ways to engage and encourage emotions more fully (Wallach, 2020). That being said, it is significant to draw attention to the acumen, awareness and composure our Educational Advisors demonstrated during this time. Emotions are a part of this framework where without emotions such as empathy and compassion, the Educational Advisors would not have been able to holistically approach the volatile challenges educational therapists were facing at diverse learning centres. The following are the distinct challenges and adaptations DAS experienced:

Table 3. Challenges and Adaptations DAS experienced

1	Warming up to the new technological norms for students with special learning needs.
2	Reinventing the way we teach: Digitising the lesson resources and online classroom behaviour management.
3	Ensuring accessibility to devices for students who can't afford or do not have a device at home.
4	Closure of schools but the continuation of service at DAS. Not allowing the pandemic to make education come to a standstill.
5	Meet the parents sessions were advised to be held online inspiring DAS to put in place online communication etiquette instructions for Educators

Were you aware that you needed to pay more attention to being more mindful in challenging situation?



Figure 12. The level of awareness from the Educational Advisors to be 'aware'.

If you were to create a mindfulness-based training for DAS Educational Therapists, briefly describe an area you would focus on to help Educational Therapists flourish. E.g. Communication skills, mindful lesson planning, well-being or job crafting.

"1) Mindful lesson planning; 2) Mindful communication with colleagues and parents; 3) Mindfully looking for suitable teaching resources"

I think the main area should be job crafting as most EDTs are doing work that they don't feel passionate about (e.g, admin work) instead of spending more time on lesson planning or teaching.

Communication with CM, Help Edts to deal with students behavioural issues

Time management and well being. (Time allocation on the different tasks, time allocation on breaks, prevent working after work hours)

An area I would like to focus on would be how EdTs could use mindfulness as a well-being tool to understand themselves and build resilience.

Figure 13. Contextualising Mindfulness at work

During a survey done towards the end of the training, Educational Advisors also demonstrated the clarity to draw parallels between Mindfulness-Based Interventions and job crafting opportunities. This was also evidently brought into play when weighing in on and re-envisioning teaching processes were concerned during the COVID-19 Pandemic. There was a transference of skills during the most uncertain times in history. Additionally, according to Sean Tierney, Microsoft's Director for Teaching and Learning Strategy, Asia, some teachers might struggle with this cultural shift due to them having to invest much energy in shifting the mind-set to transition from a comfortable and seasoned style of teaching to a completely new platform. This also welcomed a surge of queries from the educational therapists presenting who felt unprepared where lesson resources and classroom management were concerned. In fact, these do make up the main building blocks for a constructive lesson.

"When traditional teaching is your paradigm, you can get trapped inside a rigid mind-set of feeling that you must know everything about the subjects you teach and that you can't show weakness.

"Teachers may need to spend less time designing the content component (of their subjects) and more time around the learning experience so that kids can find and create their own meaning around that content" (Tierney, 2020).

In line with this, The Educational Advisors were able to guide the Educational Therapist seamlessly through providing neat, clear and relevant information that was rendered with empathy and compassion. I am citing empathy and compassion here because the Educational Advisors are well aware of the Educational Therapists' workloads, student load and the features of various challenges they have to manage. Besides, since our Educational Advisors are assigned to various learning centres, each advisor, is well aware of the intricacies in their centre, such as a particular Therapist's challenging students, teaching styles and approach to the pedagogy. Yet again, this takes a great level of awareness and emotional quotient to identify and adapt to accordingly. All the more so with the pandemic, instead of submissively shrouding beneath the weight of challenges, the Educational Advisors convened to deconstruct and reconstruct ways to guide the Educational Therapists in accordance to these new and trending needs and to ensure they were available to approach should Educational Therapists experience distress in this new norm of digital classes.

Ideally, being mindful and practising the various features of the practice has allowed our Educational Advisors to identify specific areas they need to address in order to be fully present when asked for help. The process of identifying a problem and the specifications or break down as to where they could focus better is also a step in job crafting. Educational Advisors have also shown themselves to be both diagnostic and prescriptive about their practice. Table 4: List of efforts put in place by the Educational Advisory team to facilitate transition from physical to digital classes

EFFORTS	CONTRIBUTING PERSONNEL		
Organisation of frequently asked questions to address potential lesson and classroom management challenges.	Educational Advisory Team		
Weekly welfare check-ins with Educational Therapists to tackle prevailing and potential challenges where their well- being, productivity and teaching are concerned, and conduciveness of the home environment in case they may need to use their classroom space.	Educational Advisory Team		
Virtual care pack (Educational advisory team representative)	Educational Advisory Team Representative/ CalmEd		
Well-being maintenance sessions: Emotional discovery to provide a safe platform for staff to learn about mindfulness-based/positive psychology approaches they can employ during trying times in order to flourish. (Educational advisory team representative)	Educational Advisory Team Representative/ CalmEd		
Instructional videos and information sheets for the digital classroom	Educational Advisory Team and Educational Therapists with expertise in various digital features		

According to the levels of positive psychology (Boniwell, 2012), subjective, individual and community- which translates to comprehension, practice and service- an individual has to be acquainted with building these layers, and the starting point is awareness, which is a key feature in Mindfulness. The key to mastery is Mindfulness. To be aware; the pathway for optimal human functioning to flourish.

State an example of how the presence and absence of mindfulness affects the quality of your work.

"Mindfulness will always be present no matter how much one tries to deny it."

"The absence of mindfulness affects my work to a large extent as I see myself reacting and responding rashly or in a curt manner as I do not assess and reflect the situation and its causes. However, the presence of mindfulness has allowed me to practice self-compassion and compassion towards others before reacting. It has given me opportunities to think before I speak and consider why a certain situation is occurring and how much of my attention and time I should be allocating to it. This has helped me improve my overall quality of work."

"Absence of mindfulness makes work more mundane and stressful; whereas, the presence of it allows for re-evaluation and enhancement. This eventually leads to better meaning and stress management."

"Being mindful allows me to think calmly and take action instead of just reacting. Before mindfulness, I was still unaware about being fully present in the moment and giving my full attention."

"Presence of mindfulness - makes me think deeper about the work I have to do and how I can do it better; Absence of mindfulness - makes me feel less satisfied with the work I have done."

Figure 14. How Mindfulness impacts on the quality of work

Was it easier for you to make connection between mindfulness and actual work scenarios through the practicum session?



Figure 15. Making connections between mindfulness and work scenarios

Another finding was the connections participants were able to make between theory and relevant accounts of work-related situations during practicum weeks (Figure 15).

1) Define mindfulness

Mindfulness is the ability to be fully present and aware of our inner self and outer surroundings and to be aware of our thoughts and feelings. It cultivates our mind to be fully present and engaged with what we are doing now, without distractions or judgement.

2) To what extent have you been able to apply mindfulness into your personal life post CalmEd?

I have become more accepting of things that happen around me and am able to better understand that some things are beyond my control. Previously, I would be quick to react and respond. However, through the sessions, I have learned to practice taking a step back, pause and be composed before I react and respond. This has helped me in both my personal life and work areas. Moreover, having cultivated the practice of writing down things that I'm grateful for, things that went well and contemplating on what could have been done better everyday through the 'Five Minutes Retrospect' journal, has given me a stronger sense of appreciation of the things around me. I now tend to notice and appreciate the

Figure 16. Authentic definition and connections participants were able to present

little things that bring joy and fulfillment to me. An area that I'm constantly working on is to practice mindful awareness/attention and break out of some automatic behaviours that are potential hindrance to my progress.

3) How have you been able to integrate mindfulness into work?

Yes. I have been able to integrate mindfulness in 2 aspects, 1 with my colleagues and 1 with my students. As I assume the role of a mentor and fellow colleague, I have been able to impart some knowledge on mindfulness to my mentees and colleagues. Some of these include sharing my knowledge on basic breathwork, practicing acceptance and non-judgment towards others and trying work situations. I have also been able to share with them the importance of paying attention and being aware of the present moment and responsibilities instead of being riddled with worries and demands of the job. This has been especially useful for my mentees as they are learning the ropes of the job. With my students, I have been able to get them into the practice of being grateful and appreciative of the little things that they have. I do this by getting them to share or write down things that they are grateful for and sharings on how to let go of things that they have no control over, every lesson. I have also been able to share some basic breathwork and stretching exercises with them when they get restless during lesson. Observations over time have shown me that these practices have been effective especially for my students and mentees.

Figure 17. Authentic definition and connections participants were able to present

This sample presents us with undertones of being reflective, and the flow of positive psychology layers: Individual, subjective and community levels, which is paramount of data demonstrating that participants internalised learning from CalmEd. Many advisors used terms that were articulated in training. Some of the recurring terms include, 'breathwork, stretching, calm down, non-judgment, mindful, awareness, grateful, conscious, present moment, respond, empathy and compassion.'

Participants also went on to share how they managed their emotions by consciously being aware of their surrounding and choosing to respond, not react. A BBC article on the relevance of emotions to save the world emphasises that " Emotions provide us with quintessential information about what's important and what to do next and how to do it and whom to do it with" (Wallach, 2020).

In your opinion describe your experience practising mindfulness before and after the pandemic.

Гор			
	0		There were a lot of things thrown at us during the pandemic. There were so many meetings, so many new initiatives to catch up with, adjusting to a different teaching environment and etc. It was overwhelming but setting aside a few minutes to take deep breaths helped.
	0		-Essentially for me the difference is that I will share my thoughts more or question for more clarity when it is needed.
	0		I feel that I started practicing mindfulness more during and after the pandemic as I felt the need to be employ techniques to feel calm and to show gratitude.
	0		I find that it is more effortful for me to practice mindfulness during this time of COVID-19 situation e.g. mindfully not touching things and using hand sanitizer more frequently. Teaching has also become cumbersome as I am unable to correct my students' errors efficiently.
	0		Before the pandemic, it was always using positive affirmation and the never give up attitude in me to hustle day to day, after the pandemic I start enjoy the moments, have mindful communication with people.
	0		I usually stop and think of my actions and practice mindfulness before and during the pandemic.

Figure 18. Practicing Mindfulness during the Pandemic

DISCUSSION

Through the medium of CalmEd incorporating the Calm app and Mindfulness X, this study demonstrated that 57% of the Educational Advisors involved in the training were able to develop mindfulness practices more consistently, and 43% were becoming proficient towards the end of 11 months training. This endeavour seemed to provide a solid platform from which to develop skills appropriate for a world in crisis during the COVID-19 pandemic, dealing with the constraints of changing platforms in teaching to computer based distance learning. Consequently, 100% were more aware of having to practise Mindfulness during a crisis, and 60% were able to practice composure during this time. This suggests that the training was effective in improving their ability to take responsibility towards building their individual well-being, as well as to innovatively improve their approach towards work through job crafting.

The intention of the CalmEd mindfulness/positive psychology training was to introduce the Educational Advisory team to a more holistic approach that they can explore to manage challenges in their roles as advisors, and guide Educational therapists through its principles. Through the 11 months, the main themes explored include well-being, breaking down internal conflicts like judgment, ego, acceptance and also integration into work through learning how to job craft in the respective areas that are challenging. Alongside that, this study inspired by the training was to understand how Mindfulness-Based Intervention combined with the science of positive psychology-based interventions can guide and help Educators in job crafting, so that they can flourish and build resilience whilst not compromising their well-being. In order for well-being to be the priority, an individual needs to understand the constitution of their mind, body and their spirit of motivation.

As mammals, we are homeostatic. That means we maintain certain constant balances within our bodies, temperature, for example, by adapting to change and challenge in an environment. We think of intelligence and perception as taking place exclusively in our brains, but we need awareness and intelligence to permeate the body. We must create a marriage between the awareness of the body and that of the mind (Lyengar, Evans and Abrams, 2019).For this transformation to take place, we need awareness; effective of Mindfulness. In support of this approach, the training gave the Educational Advisors the opportunity to consider internal and external influences that affected the way they felt or how they would make a decision. The elements that fulfilled these opportunities were the 10 minutes' meditations + breath-work which accentuated the connection between the mind and body, collaborative discussion on the effectiveness of Mindfulness at work, the gratitude journal exercising the power of reframing thoughts, perspectives and seeing the good, especially on a trying day or week.

This finding connects with the nurturing of Mindfulness as a trait into a state where relativity is concerned. Ideally, CalmEd's compassionate training approach has supported the theme of training -Mindfulness where it has created conditions for the participants to develop skills through the diverse approaches in mindfulness-based practices, which brings us to the fashion of adapting in accordance to the environment, culture and behaviour paving the way for opportunities to encourage job crafting.

A core feature of job crafting is that employees initiate and carry out alterations in their jobs from the bottom-up, rather than managers directing changes from the top-down like many job redesign interventions. This enables employees to leverage the unique knowledge they have of their jobs and themselves to craft their jobs in ways that create more meaningfulness (Berg, Dutton and Wrzesniewski, 2013). The idea of employees working from a fixed job description is becoming less common over time (Mohrman and Cohen, 1995). In our rapidly changing knowledge economy, organisations are placing more of a premium on employee proactivity (Grant and Ashford, 2008). Instead of just reacting to a set of job responsibilities, employees' personal initiatives in shaping their jobs often deliver benefits to organisations by fostering innovativeness and adaptability (Frese and Fay, 2001).

That being said, it is significant to draw attention to the acumen, awareness and composure our Educational Advisors demonstrated during the course of the ongoing pandemic. Emotions are a part of this framework where without emotions such as

empathy and compassion, the Educational Advisors may have struggled managing the volatile challenges Educational Therapists were facing at diverse learning centres. It is also understandable from this finding that Mindfulness mediated job crafting practices.

One of the most propitious findings of this study was that most of our participants proved that the Educational Advisors held the ability to intentionally and consciously assess a situation they were involved in. This standpoint was often grounded in their understanding of the neuroscience of emotions and newfound knowledge that they have the power to manage their emotions, thoughts and response through Mindfulness and positive psychology.

While there is limited research exploring the impact of Mindfulness on teachers, the existing research suggests that cognisance of emotions and ability to modulate emotions supported educator's well-being (Abenavoli et al., 2013, Benn et al., 2012, Roeser et al., 2013). As such, one of the essential and empowering ways CalmEd guides educators is through broadening their mental perspectives of the situations they encounter. Thus, the current study aligns with previous research (Jennings, Frank, Snowberg, Coccia and Greenberg, 2013) suggesting that the ability to reassessed situations is one outcome of MBI focusing on teachers (Sharp and Jennings, 2016).

An additional finding was that many advisors used terms that were articulated in training. Some of the recurring terms include, 'breath-work, stretching, calm down, non-judgment, mindful, awareness, grateful, conscious, present moment, respond, empathy and compassion.' Participants' use of these terms often corresponds with their descriptions of how they respond to situations in which they were emotionally activated; it is entirely possible that the participants' use of Mindfulness related terms assisted them in re-evaluating and eventually helped them to more accurately assess the situations in which they were involved, In fact, the Educational Advisors presented improvement in self-assessment backed by the SOLO taxonomy.

While reflecting about engagements during CalmEd sessions, two distinct patterns emerged; participants commented on their approach to challenges and connected mindfulness literacy with related efforts to self-regulate through reframing their thoughts.

The Educational Advisor's reflection of enhanced compassion align with previous research suggesting that mindfulness training leads to greater compassion and empathy (Cohen and Miller, 2009; Roeser et al., 2013). Compassion and empathy may be one buffer to educator's burnout, and Mindfulness may be a promising mechanism for promoting compassion and empathy; further research ought to explore the link between teacher mindfulness and compassion and empathy (Sharp and Jennings, 2015).

This study is a fresh qualitative assessment of the CalmEd programme and, as such lends support to previous research (Rajoo, 2020) indicating that the program is impactful for educators who train in the programme. Additionally, we must also consider the term 'mindfulness' in terms of the trending media and public hype over the years. The ramifications of considerable semantic ambiguity in the meaning of mindfulness are multifarious. Any study that uses the term "mindfulness" must be scrutinized carefully, ascertaining exactly what type of "mindfulness" was involved, and what sorts of explicit instruction were actually given to participants for directing practice, if there was any practice involved (Van Dam et al., 2018).

Although most mindfulness training has been derived from the original MBSR model (Kabat-Zinn, 1990), the intensity (hours per day) and duration (total time commitment) of participants' formal practice have varied considerably across different versions of training (Davidson and Kaszniak, 2015; Tang et al., 2007; Zeidan et al., 2011). The particular methods for teaching and practicing 'mindful' states have varied too. However, published journal abstracts and media reports about results obtained often gloss over such crucial variations, leading to inappropriate comparisons between what might be fundamentally different states, experiences, skills, and practices.

Given current confusion surrounding "mindfulness," we urge scientists, practitioners, instructors, and the public news media to move away from relying on the broad, umbrella rubric of "mindfulness" and toward more explicit, differentiated, denotations of exactly what mental states, processes, and functions are being taught, practiced, and investigated (Van Dam et al., 2018).

CalmEd goes beyond other Mindfulness-Based Interventions and is designed to specifically address the occupational challenges unique to DAS Educational Advisors. They had extensive opportunities to immerse in experiential learning by practising self-care behaviours and thought-processes related to it, distressing techniques and to engage in collaborative team discussions to share experiences and refine areas to improve on. Experiential-based learning addresses the gap between rational and applied practice; closing the gap by integrating mindfulness-based and positive psychology activities that are specifically linked to the respective job role challenges.

Where emotions are concerned, CalmEd was noticeably beneficial in helping Educational Advisors comprehend their emotional reactivity and transitioning from impulsive reactivity to poised responding. This in union with mindful awareness practices appeared to have helped them shift and widen their field of responsiveness, thus encouraging more versatility in problem solving.

Institutions training educational leaders should consider the CalmEd approach for linking theory into practicum to identify opportunities to integrate Mindfulness into their day to day lives. Three weeks were dedicated to each topic where the first two weeks were spent first understanding the concept and the following week devoted to practical integration where participants identified ways they could integrate mindfulness-based

concepts into a work related situation. Here, the development of positive psychology took effect as participants started exploring focusing on the strengths more than weaknesses during collaborative brainstorming sessions (Figure 3 and 9).

If at all possible, initial teacher trainings and teacher professional development may wish to consider integrating emotional skills and mindfulness instruction into their courses. To date, CalmEd training have targeted educators, however, there are other personnel e.g., psychologists, student administrators, specialist tutors) who are prime candidates for disseminating. In fact, a whole organisational approach of influencing educators, students and parents helps constructively boost the chances of changing the culture of educational environments. Educational Advisors often have their pulse on the overall organisational climate, as they get feedback from Educational Therapists, students, parents, centre managers and division directors about their concerns and struggles. One of the fruitful ways Educational Advisors can advocate for Educational Therapists is to ensure that the they are supported with necessary resources and tools to manage stressors. Some of the ways this can be provided will be through termly curated mindfulness training addressing specific job-related challenges, mandatory self-care guidance workshops for educators and mindful classroom management training that also focuses on both students' and Educational Therapists' well-being.

Educational Advisors who have completed professional development training like CalmEd describe their experiences as vital in reframing perspectives at work. However, as this programme is being further refined and metamorphosing to meet other trending needs, the sustainability of it can be further improved through perhaps creating bitesized sharing sessions on an accessible platform. This is also considering that the pandemic has inspired educators to stay on their toes where learning and teaching platform transitions are concerned. Where sustainability is concerned, accountability cannot be missed as a prime factor in success. CalmEd graduates could also be provided with additional resources to connect with one another more often to remind each other of the teachings from the training. Although the team meets weekly, amidst the influx of projects, weekly fulfilments as advisors and classes, a dedicated refresher session would keep the momentum of the practice going, and some sort of accountability measure will assist them in maintaining change.

This study has several limitations. The sample size was small; therefore, it is important to note that transferability, the extent to which the findings are transferable to other settings, and not generalizability is the aim of this study (Miller-Day 2004). Therefore, the findings of this study can be favourably transferred to educational settings similar to the DAS, and should not be overgeneralised. Beyond the educational wing of DAS, these skills can be adapted within DAS corporate wing as far as it goes. Also, the study consisted of women only. Therefore, the lack of diversity of the interviewees limits the ability to make claims about who benefits and how they benefit from their involvement in the CalmEd programme (Sharp and Jennings, 2016). Furthermore, this study relied

extensively on self-report data that was gathered through individual surveys. We could enrich the study further if we had an additional source of data (e.g., artefacts and focus groups) to provide converging evidence.

Future research should address these limitations as CalmEd intends to work with the involvement of all the Educational Therapists at DAS. This will allow us to have a more generous sample group. There will also be more diversity and even creativity in the approach of integrating Mindfulness for themselves and the students.

CONCLUSION AND THE WAY FORWARD

Now that the training has experienced a level of fruition, it can be concluded that both our educational advisors and our educators were able to practise elements of Mindfulness through the systematic series of events from training, to drawing connections and finally getting the chance to practise it during a pandemic. The study also aligns with the previous research (Rajoo, 2020) where it was evident that there were undertones of Mindfulness where workplace culture was concerned and how it affected the euthenics of the educators from centre 'x'. CalmEd's initiatives have also evolved through inaugurating the CalmEd Educator's Guidebook in January 2020. The guidebook has been carefully curated for a light-hearted experience so that educators feel at ease where the introduction of Mindfulness and its activities are concerned. With its coffeetable book approach, fresh and crisp images and simple mindfulness practices, CalmEd hopes to inspire all educators to be more responsible for their well-being.

Additionally, there are weekly curated mindful tips branded as 'Mindful Mondays' shared with the entire organisation to encourage the practice of Mindfulness, mindful parenting workshop to create awareness amongst parents, integration of mindfulness-based approaches in lectures addressing burnout, reflective practices and mindful communication etiquette for Educational Therapists, the CalmEd google site serving as the mindfulness library where staff can retrieve mindfulness and positive psychology related information and Emotional discovery which is a safe online platform inspired by the pandemic to educate staff on stress and anxiety management and provide consultation.

Ultimately the intention is to work together as one community to nurture sustainable wellbeing practices for all to immerse in, at anytime and anyplace. Moreover, having seen the impact mindfulness has on our educators, the next course of action will be to influence and enrich classroom climates through 'CalmEd classroom' initiatives where Mindfulness-Based Interventions (MBI) will be introduced to both educators and students to practise and observe the effect it has on the quality of lessons, behaviour and wellbeing. This development has also the dawn of an Educational well-being committee aiming to maintain well-being of both students and teachers in an educational setting through improving the climate of the classroom and the mental well-being of both our educators and students, that reflects the fundamental value of inclusivity. The intentions of this initiative are to minimise stress, ensure psychological safety in class, encourage contemplative practices amongst educators and students and feel empowered through finding their unique voice through mastering mindfulness.

Emerging CalmEd training for educators has the potential to guide in the development and refinement of measures linked with how individuals adopt and apply what they learn and, ultimately help clarify how participants are unique as a result of their immersion in the intervention.

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Hyperlexia in 3-year-old twins with and without Autistic Spectrum Disorder

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Abstract

This article presents a case study on hyperlexia in a pair of non-identical twins of chronological age (CA) 3 years 9 months, with and without Autistic Spectrum Disorder (ASD). The aim is to provide a better understanding of the two types of hyperlexia by establishing their profiles using various sources of psycho-educational assessment reports. Results show a word recognition age (WRA) of 5 years 9 months for the ASD male and 8 years 11 months for the neurotypical female. With a verbal functioning estimated at 1 year 6 months, the male twin exhibited an unexpected level of ability that is advanced for his CA in not only literacy skills but in numeracy as well. His hyperlexia is considered a savant ability as his splinter skills are in significant disparity to his overall impairments. Unlike her brother, the female twin has a reading comprehension age (RCA) well above her CA, but her RCA is still lower than her WRA by more than 1.5 years.

Keywords: Word recognition, splinter skills, comprehension, Hyperlexia, Autistic Spectrum Disorder, Savant Syndrome

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INTRODUCTION

Hyperlexia had been initially noticed by clinicians (for e.g., Kanner, 1943; Parker, 1919; and Phillips, 1930) as an unexpected precocious reading ability in children with severe cognitive impairment (Ng, 2014). As a developmental condition, hyperlexia sparked researchers' interest in studying it as a savant ability (Grigorenko, Klin, and Volkmar, 2003). Savant idiosyncrasy has been described by Treffert (2010) as a paradox of genius and limitation in a person with incredible memory – a facility purportedly linked to genetic memory.

The incidence of developmental hyperlexia (see Ng, 2013) has been estimated to be between 5% and 20% (Grigorenko, Klin, and Pauls, 2002). For children with autism, the frequency of its co-occurrence is between 5% and 10% (Burd and Kerbeshian, 1985). In most learning disorders, there is a higher rate of incidence in boys as compared to girls for disorders related to the left or right brain. However, there is no evidence of significant gender differences in the occurrence of hyperlexia (Grigorenko, et al., 2002). The prognosis is that such a phenomenal word-calling ability may or may not continue to develop although word recognition skills remain well above expectations in comparison to other cognitive or linguistic abilities.

Viewed within the parameters of language per se, hyperlexia is commonly referred to as the discrepancy between children's advanced word recognition and poor comprehension. It became more of a focus of language research after the term hyperlexia was coined by Silberberg and Silberberg (1967). They used it to refer to the significantly higher ability to recognize words than either the evaluated verbal functioning level or ability to comprehend the material that was read. The single-subject study by Elliott and Needleman (1976) is a case in point - the subject with a total absence of speech could recognize words before age 2 and use sentence cards and even a typewriter to make known her needs. Gradually, the use of the term hyperlexia evolved to refer to the differential language development in not just children with severe cognitive impairment, but those with typical (e.g. Niensted, 1968; Treffert, 2010) and superior IQ (e.g. Jackson and Biemiller, 1985; Pennington, Johnson, and Welsh , 1987; Whitehouse and Harris, 1984) as well.

Outside the realms of a developmental condition, language impairment, echolalia and preoccupation with print material in brain-damaged children (e.g. Mehegan, Fritz, and Dreifuss, 1972) and adults (e.g. Suzuki, Itoh, Hayashi, Kouno, and Takeda, 2009) have been described as symptoms of an acquired form of hyperlexia in research literature. In addition, unexpected splinter skill(s) such as acquired hyperlexia arising from brain damage has been described by Treffert (2010) as the accidental genius or acquired savant syndrome. It is a rare condition and sometimes more than one splinter skill is developed because of the brain damage. In a case of multiple talents in hyperlexia, Patti and Lupinetti (1993) reported on a young woman with autism and hyperlexia who

exhibited several other exceptional abilities as well, including memory for large numbers and dates. Her hyperlexia is described as a savant ability since her splinter skills were in significant disparity to her overall handicaps. The developmental form of hyperlexia can be differentiated from the acquired form by the early reading, which can take parents by surprise. Unsurprisingly, clinicians such as Pennington et al., (1987) have called hyperlexia an unexpected reading precocity.

As the compulsion to decode print stimuli without comprehension of its meaning is symptomatic of hyperlexia (Whitehouse and Harris, 1984), the precocious reading ability has been likened to barking at print and marked by echolalia. However, case studies by Aram and Healy (1988) identified 2 subtypes of hyperlexia in children, showing that they were not merely barking at print. Superior phonetic analysis was one subtype, and superior visual analysis was the other. Richman and Wood (2002) reported that these two subtypes could be traced to the different neuro-maturational etiologies for the trait of good word-recognition. The first is linked to difficulties in using right hemisphere brain processing for visual memory, hence the good reading can be attributed to strengths in the left hemisphere for phonemic processing. The brain hemisphere weaknesses and strengths are reversed for the latter subtype. On the other hand, Nation (1999) had put forth that hyperlexia should be seen as part of the normal variation in reading skills which involves differences in individuals in terms of their orthographic, phonological and semantic processing, print exposure, and short-term memory.

The labelling of comprehension impairment in hyperlexia is not as straightforward. According to Riès, Dronkers, and Knight (2016), language is reportedly one of the most lateralized human brain functions, and left hemisphere dominance for language has been reliably confirmed in both experimental and clinical settings. Therefore, the comprehension impairment in hyperlexia can be linked to a weakness in left hemisphere language processing. Based on the comprehension impairment, efforts had been made to use it to revamp the definition of hyperlexia and the "idiot savant" reference from the early days. Most notably, Healy (1982a) called hyperlexia an "enigma" instead. She also took issue with the inclusion of those with no comprehension impairment in hyperlexia. Using clinical studies as the basis, she specified symptoms, such as a spontaneous ability to read before age 5, difficulty with language processing in both listening and reading modes, an impairment of expressive language and a compulsive preoccupation with reading together with echolalia - the repeating of speech sounds, for hyperlexia. Such narrowing of benchmarks for hyperlexia have been challenged, though.

In challenging the assumption that there has to be a co-occurrence impaired comprehension in hyperlexia, Temple and Carney (1996) presented a sample of girls with Turner's syndrome and hyperlexia who had matching levels of comprehension and single word reading. Other diagnostic symptoms of hyperlexia have similarly been found. For instance, Siegel (1984) presented a case of a female child with autism and hyperlexia manifesting motor-visual skills that are severely impaired. Contrastingly, cases of children with hyperlexia showing exceptional ability to discriminate visual patterns have been presented as well (see Cobrinik, 1974; Tirosh and Canby, 1993; Whitehouse and Harris, 1984). The heterogeneity in the phenotype of developmental hyperlexia as an exceptional word-reading ability would render it as a syndrome in the context of disordered language development. Indeed, Grigorenko, Klin, and Volkmar (2003) had examined the dispute on whether hyperlexia is a distinct syndrome with comorbidities, given that it exists with several different disorders, or if it is a part of the spectrum of other disorders. They concluded with a rejection of the latter and rendered hyperlexia the status of a distinct syndrome.

Given that children with hyperlexia look normal and sound intelligent, people are likely to rule out the idea that children who can read print before preschool could be suffering from any language disorder. The assumption is that these children would eventually comprehend the meaning in the same way they easily figured out how to read the print. Their ability to read well ahead of their peers would usually give adults the impression that they are very intelligent. Indeed, there are researchers such as Elliott and Needleman (1976) who have taken a different perspective on hyperlexia and argued that it is a demonstration of a unique and enhanced cognitive ability, rather than a disorder. Unfortunately, facility with the words of the text does not necessarily promise improved comprehension (Fleisher, Jenkins and Pany, 1979). Hence, overlooking impairment in comprehension when it is masked by a child's hyperlexic tendencies can lead to a further widening of the discrepancy between word recognition and comprehension for the child.

It is therefore important to pay attention to language developmental milestones for children with hyperlexia, especially when there are no physical features on the children to mark it. Studies have shown that children with hyperlexia are unable to pass age-appropriate verbal and non-verbal Piagetian tasks (Healy, 1981; Huttenlocher and Huttenlocher 1973) - this signified their underlying cognitive deficits. To account for word recognition in cognitively disordered children, Goodman (1972) and Cain (1969) have reported that children with hyperlexia show symptoms of unusual memory for unrelated auditory and visual stimuli. Compulsive preoccupation with reading was also mentioned as a contributory factor. In a case of a compulsion to respond to print material described by Suzuki, Itoh, Hayashi, Kouno, and Takeda (2009) described as "visual groping" in a 69-year-old female patient with acquired hyperlexia and callosal disconnection syndrome, a focal lesion was the causal factor. She displayed symptoms of echolalia as well, in repeating words emanating from hospital announcements or from unrelated conversations around her. The two features were absent prior to her brain damage.

In the developmental hyperlexia case due to callosal syndrome or split-brain in Kim Peek (a.k.a. "Kimputer"), the savant who was the inspiration behind the movie Rain Man, he was said to have the Mount Everest of memory (Treffert, 2010). Imaging of his brain
show the absence of the entire corpus callosum, the large connecting tissue between the left and right hemisphere of the brain amongst other missing connecting structures. He could read and memorize books rapidly because he could read two pages at a time, one page with the left eye and the other with the right. Although his talent in reading and compulsive preoccupation with the activity is symptomatic of hyperlexia, he was also said by Treffert (2010) to be dyslexic as he could even read a page turned upside down or sideways. He was both a walking calculator and encyclopaedia - he could instantly calculate the sum and mean of a column of numbers in a telephone book and regurgitate with great fidelity, factual information of numerous areas of interest. Misrepresentations of information would not be tolerated by him – he had shouted for an actor in a Shakespearean play to stop when the actor missed some words in his line (Treffert, 2010).

According to Treffert (2010), autism was not the diagnosis for Kim but that of a developmental disorder not otherwise specified. Doctors had considered Kim to be a retard when he was nine months old, but his parents read to him a lot and by age eighteen months, he was able to memorise books read to him in a single sitting. However, he did not start walking until four years of age, and his problems with balance and hand-eye coordination continued through to his adulthood - he needed help to bathe and dress himself, brush his teeth and comb his hair. With more social exposure after the movie became a hit, he was no longer reclusive or awkward in social situations but became increasingly witty in conversations even, as his comprehension improved. His is a case in point which shows the plasticity of the brain in that it can rewire itself and even have the flexibility to even create - forming original and entirely new things other than producing literal memory recall only.

Various researchers (e.g., Huttenlocher and Huttenlocher, 1973; Mehegan, Fritz, and Dreifuss, 1972; Burd, Fisher, Knowlton, and Kerbeshian, 1987; Treffert, 2011) concur that the prognosis for hyperlexia is better than one without the phenomenal reading ability as reading is a tool for acquiring knowledge (see Ng, 2013). For the children with atypical development, researchers (Huttenlocher and Huttenlocher, 1973; Mehegan, Fritz, and Dreifuss, 1972) have reported a better lifelong outcome for them as compared to those without hyperlexia. A few studies (Burd, Fisher, Knowlton, and Kerbeshian, 1987; Burd, Kerbeshian, and Fisher, 1985) even reported markedly increased IQs for their samples of children with pervasive developmental disorders (PDD) and hyperlexia. According to Treffert (2011), the neurotypical group with their advanced reading at a very early age inevitably draws attention. Eventually their classmates catch up in reading skills, but they in having very bright minds usually, go on to have very typical, successful lives. He also noted that the autistic-like abnormalities in hyperlexia can be remediated through occupational and behaviour therapy.

Healy (1982b) has described the intense and preoccupying interest in print stimuli as a stereotypical behaviour for children with hyperlexia, and that the preoccupation replaces

other developmentally appropriate activities. To reduce such default repetitive behaviour which is self-stimulatory ("stimming behaviour"), occupational and behaviour therapy is recommended. Social skills training can also help as a lack of exposure to social activities can compound any difficulties in conforming to social rules in a group or classroom setting which typically developing children have no issues with. Social and communication deficits, if found together with the stimming behaviours in hyperlexia would imply that there is a co-occurrence of autism spectrum disorder (ASD), as the two traits can be identified under the criteria for ASD in the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5) (American Psychiatric Association (APA), 2013). In DSM-5, the "triad of impairments" from the DSM-IV-TR (2000) has been reduced to two domains - one that has the two social and communication domain items in the earlier version combined, and the other is the domain of repetitive behaviour and interests which remains separate. In addition, a new trait of unusual sensory behaviours is included in the latter domain, and the specific age of onset is no longer included in the DSM-5 ASD diagnostic criteria.

With respect to the reference to hyperlexia as a savant syndrome based on the unexpected word reading precocity, developmental hyperlexia is different from other types of savant syndrome over time as there is a ceiling on word decoding ability (Heaton and Wallace, 2004). Therefore, the gap between the word reading age (WRA) and chronological age (CA) which starts off with a significant difference earlier in the development of the child with hyperlexia would narrow with the progression of time. As mentioned, the neurotypical peers would ultimately catch up on word decoding ability. Researchers (Siegel, 1984; Sparks, 2001; Whitehouse and Harris, 1984) have reported that the word recognition skill relative to measures of comprehension in hyperlexia would stagnate or decline over time. They attributed this to the lack of progress in word decoding skills or even a deterioration of it. Correspondingly, if the comprehension improves without a corresponding advance in word recognition, the significant difference between these two measures that defines hyperlexia would diminish.

To write more specific goals and objectives in a child's Individualized Educational Program (IEP) based on the hyperlexia profile, a descriptive-based system (see Cupples, 2011) using a prescribed set of parameters such as language or reading is likely to give educators more information, than trying to determine the particular etiologic category (autism, SLI, etc.) for the affected child. According to the Simple View of Reading (Nation, 2019), the complexity in comprehension difficulties can be captured as the outcome of two groups of skills: decoding and reading comprehension. The variance in reading comprehension can be explained by the Simple View which provides a good framework to guide the classification of reading disorders. Using the Simple View where the concept of reading disability is modelled by the two components of decoding and comprehension, the child with hyperlexia can be profiled as a poor-comprehender (Ng, 2013). As dyslexia is characterized by word recognition difficulties with good comprehension in this model; hyperlexia would be considered as the polar opposite since it is characterized by advanced word recognition with comprehension difficulties (Aaron, 1989; Gough and Tunmer, 1986).

According to Healy (1982a), children with hyperlexia in their pursuit of word-reading do it with a focus and intensity where they do not look for the meaning of what they read. She pointed out the likelihood that they were unable to code what they were reading into meaningful schemata. Hence, there is a lack of interaction with the content besides the printed words, which leads to the failure of storage and retrieval of meaning to occur at all for them. To target their deficit in the formation and organization of schemata for processing what they read, remediation by schematic scaffolding supports is recommended (Healy, 1982b).

Researchers (Deevy and Leonard, 2004; Goodwin, Fein, and Naigles, 2012; Hundert and van Delft, 2009; Schulz and Roeper, 2011) have reported that poor-comprehenders have difficulties coding text based on "Wh" questions which are the who/what/where/when interrogatives. In the study by Hundert and van Delft (2009), poor comprehenders' efficiency at answering questions was higher with visual than verbal scaffolding; but the absence of scaffolding would take the biggest toll on this efficiency. Based on the effectiveness of the Scaffolding Interrogatives Method (SIM), which employs a visual scaffolding of the schemata of "Wh" questions (see Ng, 2014 and Ng, 2016), it is recommended for the respective remediation in reading comprehension.

METHODOLOGY

This study used a convenience sampling with a single-subject design to establish a psychoeducational profile and evaluation of a pair of twins suspected of having hyperlexia. With consent from the subjects' parent, the author administered a word recognition assessment and used other sources of psycho-educational assessment reports to establish their profiles to provide a differential diagnosis.

Participants' Case History

Harry and Amy (not actual names), age 3 years 9 months, are the male and female twin subjects respectively in this case study. They are a set of fraternal twins conceived via In-Vitro Fertilization (IVF) and were born after a dichorionic diamniotic (DCDA) twin pregnancy, which is a type of twin pregnancy where each twin has its own chorionic and amniotic sacs. When their mother was pregnant with them, she had gestational diabetes, eclampsia, high blood pressure and weekly progesterone shots. The twins were delivered premature at 34 weeks via Cesarean section (C-section) because there was intrauterine growth restriction of the female twin.

Twin #1 - Harry

Harry was 4 lbs., 3 oz. when he was born premature through C-section. Initially, he had apnea and bradycardia and needed ventilation for it. In premature babies, apnea refers to a pause in breathing that is of a duration of more than twenty seconds. This causes bradycardia, which is a drop in the baby's blood oxygen level. He was on a Continuous Positive Airway Pressure (CPAP) machine for six days for his Initial Respiratory Disease/Hyaline Membrane Disease. He also had patent ductus arteriosus (PDA) which closed subsequently. Feeding was introduced and this progressed slowly to complete oral feeding. Harry was discharged with his twin sister after 25 days.

According to the twins' mother, Harry started to walk and spoke his first word around 15 months of age. Currently, he is not yet toilet-trained, nor yet able to feed himself with a spoon, though he could use one to feed others. Although he has not combined words into communicative phrases, he is able to make some requests with single words, sing some songs, name letters and numbers, and echo some phrases. He is also able to understand and follow some commonly given directions. Thus, his verbal functioning level (mental age) can be estimated to be at age 1.5 years. On the other hand, if his parent spells an animal name aloud (e.g. e-l-e-p-h-an-t) with or without a written model, he can say the name. From an early age, he was particularly interested in letters, numbers and math. He easily learned shapes, colors and animal names, can count to over 100, do addition problems (e.g. 10 + 90), and is able to use internet applications, such as finding videos on YouTube with a phone or tablet.

At the pre-school he attends, Harry does not favour art activities and has exhibited challenging behaviour with tantrums, screaming and a resistance to conform to group activities. He would not sit with a group for more than 15 minutes and though he had enjoyed being in a sports class, he would not participate in the structured activities. At home, he enjoys jumping on a trampoline, swimming, and music. He shows affection to his parents and enjoys bath time with his twin sister – he would "steal" her blanket to tease her as well. At times, he can be "super stubborn" but once a connection has been formed, he can be very sweet. He also has some sensory issues with sand and water, but this is fading lately.

Twin #2 - Amy

As mentioned earlier, Amy and her twin brother Harry were delivered premature via C-Section. This was because of her slow fetal growth and fetal malnutrition. She was born 3.45 lbs. with an abnormal Doppler ultrasound. Like her twin brother, she was put on a CPAP machine for 25 hours for Respiratory Distress Syndrome/Hyaline Membrane Disease. She was given total parenteral nutrition via an umbilical vein catheter at first, then via a percutaneous long line for 48 hours. When trophic feeds were introduced orally, she did not tolerate it well. NBM (nothing by mouth) feeds were kept for another

24 hours, then trophic feeds were re-introduced, and she slowly progressed to receiving full oral feeding. As mentioned, Amy was discharged from the hospital with her twin brother Harry after 25 days.

According to the twins' mother, Amy started walking earlier than her brother at 11 months, and her toilet training was also accomplished earlier than him at 40 months. Also, unlike her brother, she met all her developmental and speech/language milestones at the expected ages. On the other hand, she had pneumonia at 6 months and was hospitalized for two nights. Currently, she takes antihistamine medication to help with breathing and snoring at night.

Amy started reading at a very early age and currently, she reads spontaneously and fluently. She loves to talk and enjoys sports, art and music, other than reading. Her parents reported that she had undergone testing and had achieved high reading and language scores, though her cognitive scores are in the average range. At the preschool she is attending, she is ahead of her peers. Nevertheless, her interests in Disney princesses are typical of girls her age as she talks about her Ariel (Little Mermaid) costume. She tries to engage her minimally verbal twin brother and sometimes acts like a "mother hen" to him. However, there is a cautious side to her, as she needs explanations prior to new experiences. She also has an excessive need to know the schedule for the day. Hence, her mother feels that she is a rather shy and anxious child when anything new is presented to her.

Clinical findings

Twin #1 – Harry

According to the report from a Speech Language Centre in the USA, which provided Harry's diagnosis of ASD, no formal tests were carried out on Harry as he was minimally verbal. Hence, observations were made on him in engaging with materials and activities presented to him, as well as in solitary play, and in interactions with his mother. His age at this assessment was 3 years 9 months.

In the beginning, Harry was given some Lego blocks and plastic letters and numbers to play with. He was observed to enjoy spreading them out on the floor, but he did not spell any words with the letters nor build with the blocks. He periodically approached his mother and took her glasses off before putting them back on her once.

A pop-up book called Animal ABC was also presented to him, and he showed interest in the animals for a while and named them. When his mother spelled elephant, he said the word correctly. He also named some numbers and letters. In addition, he was verbally asked to add 10 + 90, 10 + 30 and 10 + 80, to which he responded correctly each time.

Although he did not want to look at the book for a second time, he returned to it later, on his own.

Harry had also been observed to pick up a stack of post-it notes to play, and the clinician took the opportunity to engage him by writing names of animals on them. When asked, he responded by reading each of the names correctly as well. Subsequently, he placed the notes upside down along the edge of the table he was working at and correctly read the upside-down words when asked. When a word-to-picture match game was presented to him, he easily matched the words to pictures with the printed word below. He also matched words to pictures without printed word cues correctly when his father was working with him.

Later during the session, Harry was presented with some game applications on a tablet which were on math, first words and writing words. While prompts in the applications supported his responses, it was clear that he knew the spelling of many of the words. Also, after a few demonstrations, he was able to trace letters with his finger following the number prompts. He also could choose the correct answer to the math app addition and subtraction problems. However, over time, he just pressed any number without trying to solve the problems.

A word recognition assessment was administered by the author about a month later to measure Harry's literacy ability. The test was the Carver Word Recognition Test (Carver, 1970) for young children, and it is scaled for the age range of 4 years 6 months to 8 years 6 months. Although Harry's CA was below the lower end of the range, the test was used as he was reported to be able to recognize words and spell them. As an accommodation for his preferred style of communication, the multiple-choice answers of single words for each question were written with one word per post-it note for him to pick out the word spoken to him in the test administration. There was only one practice item on the test to familiarize him on the test procedure, to which he performed effortlessly and correctly – he took only a momentary look at the array of the five words given before picking out the correct one.

Harry was given ample time to complete the test and sometimes the word was repeated to ensure that he had heard it carefully. He was also given reminders to make sure he had looked at all the words in the array given before picking one out. There were limitations to the test of fifty questions - he had displayed signs of fatigue and the lack of interest as the test wore him out gradually. Periodically, after selecting an answer for a question, he would dash off from his seat and sprint around the room, but somehow, he was compelled to return to his worktable for the next question. Also, he had only a couple of very brief encounters with the author prior to this assessment, during which he was minimally verbal and did not sufficiently engage in eye-contact with her. Given his own home as test environment, he was nevertheless very comfortable. Snacks, music videos and a sentence game on the iPad played during breaks kept him engaged to finish the test.

Item No.	Variable	Measure	
1	Chronological Age (CA)	3y 9m	
2	Mental Age (MA)	1y 6m	
3	Carver Word Recognition Test Score	27/50	
4	Carver Word Recognition Age (WRA)	5y 9m	
5	CA - MA	2y 3m	
6	WRA - MA	4y 3m	
7	WRA - CA	2y 0m	

Table 1 – Results of Assessments for Harry

Table 1 above shows the results of the assessments for Harry. His raw score on the Word Recognition Test (Carver, 1970) is 27 out of 50. This gives him a Word Recognition Age (WRA) of 5 years 9 months and a Stage 5 in the Word Recognition Ability Scales according to Carver. The scores are grouped at three-monthly intervals to avoid unreal exactness in giving the child a precise age level of reading. As indicated by this assessment, Harry's WRA is well above expectations for his CA and MA by about 2 years 0 months and 4 years 3 months respectively.

The errors Harry made are the phonetic type, with mid vowel sounds constituting the largest group of errors. There are nine of these, found in the words trap, jam, just, has, met, pen, bus, wing and kettle. The next most common is the initial letters error type, where there are four errors (inkpot, night, quiet and trap). For word endings, there are four of such errors (lick, you, wig and kettle). Next, there are two errors for each of the following errors types: combined vowels (boat, rain), r-controlled vowels (bird, part), letter reversals (saw, nod), and phoneme omission (place, post).

An assessment of Harry's language ability was also attempted by the author prior to the administration of the word recognition test. The test used was the Verbal Abstractions subtest of the Pictorial Test of Intelligence-Second Edition (PTI-2) (French, 2001), which is a revision of the Pictorial Test of Intelligence (French, 1964). PTI-2 is an objectively scored, individually administered test of general intelligence for both normal and disabled children ages 3 years 0 months through 8 years 11 months. The recommended testing time the Verbal Abstractions subtest was 15 to 30 minutes.

In the test, Harry was required to identify the correct picture to match the spoken description by circling the picture. There are two practice questions which were

administered before the start of the test, but he did not provide any responses to them. Even when the author pointed to each picture and asked him if it was the correct one, he would not respond. Eventually, the answer was given to him and the circling was done hand over hand with him. When he still did not provide any responses to the second practice question, the same correction procedure was repeated.

After the practice exercise, the actual test questions were administered. The author carried out the required questioning procedure to elicit responses from Harry, but he still did not attempt to point to or circle any answers. As per test requirements, no prompts or assistance was provided for him to point to or circle the correct picture. Without making any eye-contact or expressing any confusion about the instructions, he disengaged himself from the task and quietly dashed off. He did appear to be expecting the same practice questions support for the actual test question and felt let down when his expectations of prompts and assistance were not met. The testing was then stopped as he would not return to the task.

Other than administering the tests, the author made some observations on Harry's behaviour. He had a favourite spot under the dining table to lie down on and he was observed to bump the top of his head on the underside of the table as he rose from under it on one occasion. Though he cried out loudly and distressfully, he did not approach his mother for comfort even as she expressed very concerning and soothing words to him. His mother mentioned that the particular behaviour had occurred several times before. On another note, during one of the author's visits to his home, he was experiencing an urge for a bowel movement. He then quietly squatted down in one corner of the room to do the job in his diaper.

Repetitive behaviours noted by the author on him other than his trampolining is that he likes to recite the numbers indicated at the lift outside his front door as the lift goes up or down. Inside the apartment, he likes to recite the date and time on the clock by the front door periodically and enjoys being picked up by his mother to reach up to the height of the clock. Also, in one of the videos shared by his mother, he was shown to enjoy playing repeatedly with a set of number blocks by reciting the numbers in ascending order as he encloses one block with a larger sized number block over and again until the largest block is used, then he uncovers the blocks one by one while reciting the numbers in descending order.

Twin #2 - Amy

According to the report from a Speech Language Centre in the USA, several formal tests were carried on Amy as she was cooperative, and she easily engaged in joint attention to the test materials. Her age at this assessment was also 3 years 9 months, as it was carried out at the same time her brother Harry had his assessment.

Item No.	Variable	Measure
1	Chronological Age (CA)	3y 9m
2	WJ Reading Comprehension Age (RCA)	7y 2 m
3	WJ Word Recognition Age (WRA)	8y 11m
4	RCA - CA	3y 5m
5	WRA - RCA	1y 9m
6	EOWPVT-4 Expressive Language Age (ELA)	6y 4m
7	ROWPVT-4 Receptive Language Age (RLA)	5y 9m

Table 2 -	Results	of Assessments	for	Amy
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Table 2 above shows the results of the assessments for Amy. Her literacy and reading abilities were assessed using two subtests of the Woodcock Johnson (WJ) Tests of Achievement. For the Letter-Word Identification subtest, she was required to read a list of words. Her score on this test was an age equivalent of 8 years 11 months, which is equivalent to a 3.5 grade level. This shows that Amy's reading decoding is well above expectations, with a word recognition age 5 years 2 months higher for her CA of 3 years 9 months. She had used both phonetic decoding and sight-reading strategies and correctly read words such as "knew", "library" and "brought".

For the Passage Comprehension subtest, Amy was required to fill in the appropriate word in a sentence or identify pictures. Her score on this test was an age equivalent of 7 years 2 months, which is equivalent to a 1.7 grade level. This shows that her reading comprehension is also well above expectations, with a RCA 3 years 5 months higher for her CA of 3 years 9 months. For all the test items, she was able to select a picture that matched the given phrase. She was also able to decode a "fill in the blank" sentence with and without a picture cue. Besides, she was able to read the test form questions and answers, as well as sentences in a book. Nevertheless, her WRA is still higher than her RCA by 1 year 9 months.

Amy was also administered the Expressive One-Word Picture Vocabulary Test – 4th edition (EOWPVT-4) (Martin and Brownell, 2011), where she was to identify out of four pictures one that represented the stimulus word which is verbally presented. She achieved a Standard Score of 138 (mean standard score 100, Standard Deviation – SD = 15), which is more than 2 SDs above typical children her age. The age equivalent of her score is 6 years 4 months, which puts her in the 99th percentile for single word expression.

The Receptive One-Word Picture Vocabulary Test – 4th edition (ROWPVT-4) (Martin and Brownell, 2010) was administered to Amy as well. In the test, she was to choose from an

array of four pictures, the one that represents the stimulus word that was verbally presented in each question. She achieved a Standard Score of 125 (mean standard score 100, SD = 15), which is more than 1.5 SDs above typical children her age. The age equivalent of her score is 5 years 9 months, which puts her in the 95th percentile for comprehension of single words as compared with typical children her age.

A further assessment of Amy's comprehension was carried out using a test called the WH Question Comprehension Test (Vicker, 2002). There are 10 questions in each of six question categories to be asked. Answers are considered correct as long as they corresponded to the category (e.g. who/a person; where/a place), regardless of the accuracy of the answers. Although the WH Question Test is not a norm referenced test, it is expected that a child of Amy's age would be able to respond to some of the WH Category questions. She did very well with full marks for two categories and only one or two errors in the other categories. The few errors that she made was linked to do telling what frightens people or being scared - she denied being scared of anything.

Other than examining Amy's ability to respond to WH Category questions by the quantitative data above, the test was reportedly used to assess her language in context and to note how she described and/or explained a concept. The qualitative data showed that her descriptions were well organized, and she had grammatical ability well above expectations for children her age. For instance, when asked the question "How do you make the letter A", her response was "make a slanted line and make another slanted line. Then go across". With another question "Why do firemen wear special clothes", her response was "Cause they don't want to burn themselves". Other qualitative data noted includes her social conversations with the clinician where she easily talked about princesses, and even sharing about herself that when she was a baby, she couldn't eat; so the doctor put a needle in her hand to feed her.

Observations were also made by the author on Amy during the visits at her home. Right from the start, she was chatty and bubbly with social exchanges, showing no reservations about meeting the author, though she had never met her before. At one instance, she defended her twin brother's aloofness by stating that he does speak to her and other family members. This is likely attributed to her being informed about the purpose of the author's visit. Her ability to provide empathy for her brother and understand the role the author was playing instantly impressed the author tremendously. During another visit when her brother was engaged in the testing, she was able to refrain herself from distracting him, though she kept looking on, appearing to be eager to take the word recognition test herself. While her brother preferred to graze on snacks when the testing was on, she was able to sit quietly at the dinner table to eat a proper meal with her mother. On yet another occasion, she got home from her dance class while the author was visiting and she happily shared about her dance outfit, as well as the dress her mother got for her in preparation for her upcoming birthday party.

DISCUSSION AND CONCLUSION

Based on the above historical and clinical findings on the twins, it can be concluded that both of them satisfy the criteria for the diagnosis of hyperlexia. This is as both have the unexpected precocity in word recognition with spontaneous reading ability. Each of them has a word recognition ability that is significantly advanced as compared to typically developing children of their age. Their word recognition ability is also significantly higher than their evaluated verbal functioning level or ability to comprehend the material that was read, which corresponds to the criteria of hyperlexia proposed by Silberberg and Silberberg (1967).

While Harry's level of comprehension cannot be assessed by conventional tests, his verbal functioning level can be estimated to be at age 1.5 years based on the report by his mother that he has not combined words into communicative phrases, but is able to make some requests with single words, sing some songs, name letters and numbers, and echo some phrases, as well as following some commonly given directions. His verbal functioning is thus in stark contrast with his twin sister's verbal expression level of 6 years 4 months as given by the EOWPVT-4. Hence, for Harry, his hyperlexia is marked by a deficit of 4 years 3 months between his WRA and MA (based on verbal functioning age). As for Amy, the discrepancy between her comprehension and word recognition is smaller since her RCA is lower than her WRA by 1 year 9 months.

As for the social and communication deficits found together with the stimming behaviours in hyperlexia for Harry, it can be concluded that there is a co-occurrence of ASD for him. There is no issue of ASD for Amy as she does not have such symptoms. Hence, Amy can be categorised under Treffert's (2011) neurotypical group with hyperlexia. In addition to the etiologic category of ASD in Harry's hyperlexia, he has exhibited an unexpected level of ability that is advanced for his age in not only literacy skills but in numeracy as well. Hence, his hyperlexia is considered a savant ability as his reading and word recognition talents are in significant disparity to his overall impairments. This is consistent with the mentioned case by Patti and Lupinetti (1993) on a young woman with hyperlexia and ASD who also has several other stunning abilities, including exceptional memory for dates and large numbers.

In addition, Harry's ability to read words upside down as noted in the report is suggestive of one of the skills that Kim Peek, the savant with the Mount Everest of memory (Treffert, 2010), had. Inexplicable as the abilities are, Harry's savant abilities could be attributed to genetic memory as purported by Treffert (2010). On the other hand, as there are "Matthew effects" (Stanovich, 1986) where the biblical concept of the rich get richer and the poor get poorer is applied to reading. Hence, his word bank would have been growing exponentially because of his perseverative interest in reading.

Other than using an etiologic category description, a snapshot of the twins' psychoeducational development can be seen from a descriptive-based system based on the parameters of language and literacy. Though the subjects are of the exact same age since they are twins, the assessments of their competencies on language and literacy show that they are at different levels of development. Amy is not only ahead of her typically developing peers in word recognition, but in comprehension as well. This is as her WRA is 5 years 2 months higher than her CA of 3 years 9 months; likewise, her comprehension age is higher by 3 years 5 months. This implies that she does not have a comprehension deficit based on her CA, and her hyperlexic reading is not a case of barking at print or is carried out without any understanding of what was being read. Like his sister, Harry's word decoding skills are well above expectations for his CA, but not advanced as much as hers, since his word decoding is advanced by about 2 years for his WRA of 5 years 9 months.

By evaluation, Harry's verbal functioning level is below his CA by about 2 years, while that of Amy's is conversely higher by about 2 years. This is as Amy's EOWPVT-4 shows that her verbal functioning level is more than 2 SDs above typical children her age, and she is in the 99th percentile for single word expression. In addition, her ROWPVT-4 puts her in the 95th percentile for comprehension of single words; and she performed beyond expectations, quantitatively and qualitatively, in answering "Wh" questions for her age. Therefore, there are no issues of concern for Amy's hyperlexia. However, the same cannot be said for Harry as his verbal functioning is lower than his CA, which results in a huge gap of 4 years 3 months between his WRA (5 years 9 months) and MA (1 year 6 months), so the remediation of the disparity for him is crucial.

While Harry's twin sister Amy has strengths in both phonemic and orthographic processing for reading, his hyperlexic profile is that of the orthographic subtype, i.e., his good reading can be attributed to strengths in using his right hemisphere brain processing for visual memory. This is as the errors he had made in the assessment of word recognition are the phonetic type, showing that he is limited by his weakness in using the left hemisphere for phonemic processing. Therefore, he would benefit from learning phonics to make fewer errors in word recognition. Phonics would help him decode unknown words phonologically as well, in order to overcome his limitation. Given that he has a greater propensity to pursue knowledge in the subject area of literacy besides numeracy and thrive in it, the feeling of success in these areas can boost his self-esteem and social-emotional health. This can help to compensate any feelings of inadequacy when it comes to doing things that are not in his forte.

For Harry's language comprehension and expression, teaching strategies that leverage on his propensity to read texts would help. Although he is reportedly affectionate with close family members, with the author, he has been observed to prefer to avoid eyecontact or pay attention to complex spoken language. Hence, there is a likelihood of him overlooking the social language and behaviour of others around him. The assessments have found that he does not engage easily with unfamiliar social situations or unstructured/open-ended tasks based on spoken instructions such as artwork. Instead of avoiding activities that he does not like, it is recommended that better support be provided to make activities amenable to his learning style. For example, tasks can to be broken down into smaller steps with written and pictorial cues to guide him with the verbal delivery. This would help him see the stages towards an end-product for him to be able to understand and stay engaged with verbal instructions. The predictability of an activity as prescribed would make him more amenable to participating in group activities, thus helping him assimilate socially.

As a lot of information on social behaviour exists in an unspoken format, Harry's default mode of avoiding eye-contact and possibly a consequent failure to observe people's facial expressions can lead to an increasingly widening gap between him and typically developing peers in understanding social situations. Unlike his sister who showed great empathy by defending his aloofness to the author as mentioned earlier, his difficulty in inferring from another person's viewpoint can be described as mind-blindness. According to Baron-Cohen (2011), such difficulties are linked to alexithymia – a condition where one lacks the ability to understand emotions. Therefore, explicit scaffolding on the observation and scripted role-play of social language and behaviour with positive reinforcement is recommended. With practice and application, he can improve in understanding instructions and making inferences on the appropriate things to say or do in social contexts. Also, schematic scaffolding of written texts such as the Scaffolding Interrogatives Method (Ng, 2014) for "wh" questions would help him with the decoding of syntax in written language, which can lead to an improvement in his listening comprehension as well.

In conclusion, it is hoped that the knowledge of what to expect and the strategies to help young children with hyperlexia shared here can be useful to educators, parents and caregivers – those whom the children depend on for their holistic care and development. Time is of the essence as undesirable behaviours can become hard-wired over time; therefore, early intervention is recommended as it can make the job of modifying a child's developmental trajectories easier. It would be good to bear in mind that hyperlexia is a syndrome which involves differences in reading abilities based on the orthographic, phonological and semantic processing, as well as the print exposure and short-term memory in individuals (Nation, 1999). Lastly, it would also help one to know that the neuroplasticity of the brain offers hope in bridging the learning gaps discovered in the diagnosis of the enigmatic splinter skill of hyperlexia in the savant syndrome.

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Student Voice on Teachers' Attributes that Resulted in Positive Learning Outcomes for Students with SEN in Mainstream Schools in Singapore

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Abstract

The Singapore mainstream classroom is seeing increasingly diverse learning capabilities. Although there is growing involvement of students in educational research, there is little done from the perspectives of students with Special Educational Needs (SEN) in Singapore. To bridge this gap, this study investigated the perceptions of students with SEN on teacher attributes and student outcomes in mainstream classrooms in Singapore. In a focus group setting, five students (aged between 14 and 16) were asked to share their opinions and thoughts based on their school experiences regarding teacher attributes that led to positive student outcomes in an inclusive mainstream classroom. Pictorial cards and the Diamond 9 ranking approach were used to help the students describe their experiences and rate the teacher attributes and student outcomes. 'Respect', 'caring' and 'patience' were top ranking teacher attributes that the students felt are important to their learning in school. For student outcomes, self-concept in terms of self-awareness and how they performed in relation to their peers were found to be important benchmarks. These outcomes were more important than 'praise and rewards by teachers' and 'competition with their peers'. The study also raised issues around victimisation and development of reciprocal friendship, and the teacher's role in helping to overcome or enhance such experiences in an inclusive classroom setting. Teacher training was highlighted too, particularly in developing skills and knowledge to handle a classroom of students with diverse learning abilities.

Keywords: Special Educational Needs (SEN), teacher attributes, learning outcomes, student voice, dyslexia, focus group, Diamond 9.

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INTRODUCTION

Although Singapore has been a member of the United Nations Convention on the Rights of the Child (UNCRC) since 2009 and ratified the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in 2013, there has been limited research carried out on inclusive education in Singapore.

In Prime Minister Lee Hsien Loong's inauguration speech in 2004, explicit mention for Singapore to be a more inclusive society was publicly announced (Poon, Rao and Wettasinghe, 2013; Walker and Rao, 2016). This resulted in government policy changes with major increase in funds to support children with mild disabilities through professional development of teachers and redevelopment of school infrastructure.

Poon and colleagues (2013), reported that in 2006, the prevalence rate of children with SEN was 1.2%, with about half of these children in mainstream schools and the other half attending special schools. However, they noted that this is likely to be an underestimate, as the reported incidence among preschoolers for the same period was around three times higher. In comparison, Scherri and Schulte-Korne (2010) reported that the prevalence rate of developmental dyslexia is between 5.3-11.8% in the United States, whereas in Hong Kong, around 9.7-12.6% prevalence rate was found (Chan, Ho and Tsang, 2007). Furthermore, Schumacher, Hoffmann, Schmäl, Schulte-Körne and Nöthen (2007) noted that as many as 20% of children with dyslexia were also diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). They further stated that in adolescents, social behaviour disorder was also often associated with dyslexia. There is therefore a relatively high prevalence of students with SEN in the mainstream schools although many of them may go undetected.

Learners Voice

Niemi, Kumpulainen, and Lipponen (2015) noted that students are more vocal nowadays and are better at articulating their views and opinions on important issues relevant to them. Recently, there has been an increase in the involvement of students in educational research and their involvement as respondents in research studies are giving them a voice on important issues (Clark, 2012). Therefore, the purpose of this study to provide a platform for students with SEN to articulate and share their thoughts and experience on teacher attributes that have positively influenced their learning at school.

Research Questions

Most studies have directly surveyed or interviewed teachers to get their perspectives. However, in view of the growing involvement of students in educational research, the perspective of the students receiving instructions from these teachers is particularly important. This is even more important when it concerns the qualities and attitudes that have helped or hindered the learning outcomes in school of students with SEN.

The following gaps have been identified:

- **Gap 1** Little research has been done in understanding the impact of teachers' attitudes on the integration of students with and without SEN.
- Gap 2 Little to no research has been done from the students' perspective on the attitudes of teachers' regarding the impact on them as well as their own perceptions of inclusive education in Singapore. In particular, for students with SEN, these actions by the teachers may have affected their integration in the classroom environment.

To bridge these gaps, the corresponding research questions are:

Research Question 1

What are the key teacher attributes that students perceived to be critical in creating a positive learning environment in an inclusive classroom?

Research Question 2

What are some of the positive learning outcomes achieved by the students as a result of these positive teacher attributes?

The mainstream classroom will continue to see an increasing number of students with SEN that require specific learning support in school despite the tandem growth in special schools for students with more severe learning disabilities (Poon et al., 2013). Walker and Rao (2016) argued that this continuous growth and awareness of learning disabilities in Singapore makes it critical for us to recognize the importance that attitudes of teachers play towards inclusive education. This will mean that the right policies and practices can be put in place to support the unique educational system in Singapore due to our multicultural and multi-racial society. This research therefore aims to provide a better understanding of teacher attitudes and mind-sets towards students with special learning needs, and what changes may be required to build a better learning environment for them to achieve to their fullest potential in school.

Definition of SEN – for this particular study, students with SEN is defined as students who are diagnosed with Dyslexia, Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) as they are the three main disabilities found in the mainstream schools in Singapore. (Chee et al., 2015).

LITERATURE REVIEW

In 2004, a key theme was for Singapore to be an open and inclusive society, where a cohesive community lives in harmony together with the disabled. This created new opportunities for students with SEN in Singapore, together with the provision of support in mainstream schools for these students through the Teacher Trained in Special Needs (TSN) (Chee et al., 2015).

Trend towards inclusive education in Singapore

Starting from 2005, the Ministry of Education (MOE) allocated at least one trained staff to support the learning needs of students with SEN in all primary and some secondary schools. These professional trained staff, called the Allied Educators (learning and behaviour support) or AED(LBS), will collaborate with mainstream teachers to help transition and co-ordinate students with SEN into the mainstream classroom (Poon et al., 2013).

Teachers in mainstream schools are trained by the National Institute of Education (NIE), which is an institute of the Nanyang Technological University (NTU). NIE offers teacher preparation programs at various levels, from degree to postgraduate diploma. All these levels include a course entitled 'Teaching and managing diverse learners in the classroom' that provides teachers with some understanding to support students with SEN. However, there is a growing concern from beginning teachers regarding their lack of specific knowledge and skills to make the necessary changes for a class of diverse learners in a group setting (Heng and Tam, 2006; Poon et al., 2013; Walker, 2016). Forlin and Chambers (2011) noted that even experienced educators have doubts about their ability to provide effective intervention for these students. Therefore, one of the biggest challenges that educators faced is the appropriate adaptations of the educational curriculum in mainstream schools such that children with special needs will be able to learn alongside their peers without feeling frustrated when they are unable to keep up.

Teachers attitudes and their impact on student outcomes

Many studies have shown that teachers have significant impact on the learning outcomes of students and that these outcomes have strong correlations to the success of implementing inclusive education systems (Lim and Sang, 2000; Chee et al., 2015). Studies have also indicated that with more exposure to students with SEN, positive teacher attitudes will become even more positive. Goncalves and Lemos (2014) argued that a critical role of a teacher is not only to promote positive interactions among students with and without SEN, but also to provide information and knowledge. This helps to deepen the understanding of students with SEN which will further support the development of reciprocal friendships so that students with SEN can experience positive social interactions and acceptance in an inclusive setting. On the other hand, some studies found that teachers with negative attitudes towards children with SEN might find it difficult to change their own behaviour over time. Nonis and Jernice (2011) conducted a longitudinal study to compare the acceptance rate of teachers on including students with SEN in their classrooms. The study found that there is no increase in the acceptance of students with SEN over time, with a potential consequence that such negative teacher attitudes could lead to low expectations and therefore lesser opportunities for these students to reach their full potential in school.

A study by Kususanto Ismail, and Hazri, (2010) further found that teacher behaviour and expectations have significant influence on the students' self-esteem. The stigma associated with a SEN label, coupled with the negative perception teachers have on these students, can lead to bullying or victimisation (Hartley, Bauman, Nixon and Davis, 2015) and loss of self-value or self-esteem (Kususanto et al., 2010; De Boer and Pijl, 2016).

Robinson (2017) pointed out that another major area of concern was what constitutes effective inclusive teacher education for special education needs. Scotland and Finland were cited as countries whose education system are able to respond to diverse learners by enabling participation, with a particular focus on the inclusion of learners with SEN in the mainstream classrooms. As Singapore aspires towards greater inclusion in our education system, there is much we can learn from these countries.

Although there are many studies from other parts of the world about teachers' attitudes towards inclusive education, such studies are found lacking on teachers in Singapore (Chee et al., 2015). Narrowing this knowledge gap is important to implementing a successful inclusive environment in Singapore mainstream schools.

Student perspective on class interaction and support

Research results have indicated that in an inclusive classroom, students with SEN often felt academically inferior to their peers (Weber and Freund, 2017; Schwab, Sharma and Loreman, 2018). Recent research further shows that these students with SEN are less socially participative as well. Schwab et al. (2018) studied data from 1,115 students in primary and secondary schools in Austria, age ranging between 10 to 14 years old. Of these students, 129 were diagnosed with specific learning differences. The results showed that students with learning difficulties scored lower in all four themes of the study (i.e. they made less friendships, had lesser interactions, were not well accepted socially and had more negative self-perceptions of their social integration when compared with other students who did not have learning difficulties). These results were consistent across all age groups and indicated that students with SEN had lower social participation in schools.

In Hopkins (2010) research on classroom settings for effective learning, she focused on

the views of the students, aged between 11 to 14, on the support and environmental factors in the class that lead them to appreciate the learning process and be recognised when they performed well. She also incorporated the card sort exercise (or Diamond 9 ranking system) to gather further material about the comparative importance of the classroom conditions. The results showed that the most substantial condition that led to higher satisfaction in classroom learning was the quality of the social interactions created by the teachers in the class. According to the students, teachers need to show respect to them as individuals; provide positive reinforcement when they make good progress as well as give clear instructions and explanations on their subjects. Being an expert in their subject matter was not considered as important as the teacher's ability to effectively interact with the students. For student achievements, the most effective way was to provide targets that the students can work towards; include comments on how to improve as well as provide praise when they have demonstrated achievements towards the target. The students ranked rewards of lower priority and importance.

O'Rouke and Houghton (2008) studied the perceptions of secondary school students on academic and social support mechanisms in the mainstream inclusive classrooms. Each response option has an emoticon-like facial expression, which were found to be extremely useful in previous studies. The results showed that mechanisms that focused on good teaching practices were positively correlated to academic success. Working together with their peers on projects were rated highly by the students, which they deemed as a positive social outcome for them.

RESEARCH METHODOLOGY

Due to the limited research on this topic in Singapore, a qualitative approach will be used as it is more suitable for exploratory research (Dare, Dare and Nowicki, 2017). Dare et. al. (2017) further noted that a qualitative approach is particularly useful for relating to social issues like inclusion.

Focus group interviews will be conducted to examine student's perspectives towards the research questions being investigated. This approach has been proven to be effective at accessing the learners' voice, or capturing the experiences and perceptions of individuals (Hopkins, 2010).

Participants

The participants of the focus group consist of 2 boys and three girls who are all studying in different mainstream secondary schools in Singapore. The age of the participants ranges from 14 to 16 years old and are all formally diagnosed with Dyslexia and are currently receiving remediation for their dyslexia at the Dyslexia Association of Singapore (DAS). All the participants were assessed to be dyslexic when they were in primary school and have received intervention both at school and with DAS for at least 4 years.

Research Design

This study will use a focus group consisting of 4 to 5 secondary students with SEN (ages between 14 to 16 years old) who will be asked to articulate their thoughts on what actions or behaviours created a favourable environment in their classroom. Specifically, the students will be asked to share their experiences and opinions on what teacher attributes and actions contributed positively to their learning journey in the mainstream classroom using the Diamond 9 approach. The students will be tasked to sort and rank the items in a diamond formation as shown below.



Figure 1 Diamond 9 ranking

As explained by Clark (2012), the tip of the diamond (Row 1) is for the top ranked item. Following that, the next two highest ranked items are placed in Row 2. The ensuing three items, placed in Row 3, are generally neither important or unimportant and considered of neutral significance. The next two items (Row 4) and final item (Row 5) are those that are ranked as of having the least importance. However, the positioning of the items is not the main takeaway of this exercise. More important is the process of arriving at these rankings through lively debate, interactive and reflective exchange of ideas, engaging in negotiation of the rankings as well as the eventual arrival of consensus after taking into account other views and perspectives.

Data Collection

The participants of the focus group are students of the researcher and this will be conducted in their classroom at Dyslexia Association of Singapore (DAS), a familiar setting for them. This will ensure that the students feel comfortable and secure, and are able to open up their minds to contribute to the research. Gill et al. (2008) argues that a pre-existing group that is familiar with each other and have shared experiences in the particular issue of interest may be an ideal research sample. They will feel at ease in engaging in the group discussions, as well as reflecting and challenging one another's ideas, which will facilitate the contribution of meaningful and concrete evidence to the topic.

The diamond-ranking activity will be used for students to work together and rank a set of nine pictures on teachers' attributes, with the most preferred at the top and the least preferred at the bottom of the diamond shape. The participants will also annotate the diamond with comments and explanations. In order to cue the students' conversation, picture cards will be made in advance to help the students. Students will also be given empty cards to add their own qualities if the suggested cards do not adequately represent their views.

In the first research question, students will be asked to reflect on teachers who had made their learning process in the class enjoyable. Refining and adapting from the findings from several researches on this topic (Hopkins, 2010; Mahat, 2008), the following are nine suggested teacher qualities with corresponding pictorial representation that will be ranked by the students (see Figure 2).

For the second focus group question, students will deliberate on how the actions undertaken by the teacher have helped them feel more included in the classroom despite their learning difficulty and thereby resulting in positive outcomes. These can be in terms of either positive academic outcomes or positive social outcomes, or both. Similarly, below are some suggested outcomes adapted from some research studies (Dare and Nowicki, 2018; Hopkins, 2010) which the students can expand or eliminate. They will need to come up with nine outcomes and rank them according to the Diamond 9 method.

A pilot focus group discussion was conducted to validate the use of the picture cards as well as the key terms and examples used. They were asked what each card meant to them and whether there is a common understanding and agreement that the suggested qualities are indeed relevant. The purpose is to identify improvements to the process and any unanticipated problems in carrying out the full discussion due to logistical or procedural challenges.

- Patient provided additional time to complete at his/her own pace
- Caring and kind makes the student feels included in class activities
- 3. Treated with respect not labelled as slow or different
- Treated as individuals know students by name and remembers their strength and weaknesses
- 5. Humorous able to use humour to ease class tensions and stress
- 6. Interactive lessons instead of instructive
- 7. Praise provides timely and specific praise
- 8. Sets clear Goals achievable targets jointly established
- 9. Clarity good knowledge of subject-matter and able to explain new concepts clearly and give valid examples.

PATIENT	CARING	RESPECT
		the second se
INDIVIDUAL	HUMOUR	INTERACTIVE
8 80		
PRAISE	GOALS	CLARITY
	SA A CONTRACTOR	ALL DA

Figure 2 Teachers attributes – pictorial cards and their respective description

- 1. Feeling good to be at the same level as peers
- 2. Classmates able to see me do well
- 3. Being told by the teacher that I am doing well/have improved
- 4. Reports showing improvement in grades
- 5. Having lots of friends
- 6. Being competitive and doing better than peers
- 7. Great comments on my work
- 8. Being rewarded for my work
- 9. Meeting all the set targets and goals

Figure 3 Positive academic and social outcomes

The flowchart below depicts how the proceedings were carried out (see Figure 4).



Figure 4 Proceedings of the focus group discussions

Data Analysis

Content analysis of focus group discussions was conducted using systematic coding and categorisation of information to determine key patterns and themes that were being raised. Following the full transcription of the voice recordings from the focus group discussions, the analysis was carried out using the procedure described in Figure 5 below.

Step 1 – Go through the transcript and identify sections that were relevant to the research questions.

Step 2 – Establish a classification system for major topics and issues based on the above initial reading.

Step 3 – Colour code or highlight using different colours for each of the major issues identified. The colour coded text could be phrases, sentences or exchanges between students that were found to be relevant to the category with which it has been identified.

Stage 4 – Coding may be repeated when topics evolved during the analysis and further insights from the content of the focus group discussion were revealed.

Step 5 – Sort each piece of coded material so that all material relevant to a particular issue is placed together.

Step 6 - Each issue is treated in turn with a brief introduction. The various pieces of transcribed text are used as supporting materials and incorporated within an interpretative analysis.

Figure 5 – Procedure of data analysis

RESULTS AND FINDINGS

The results of the two research questions are presented separately for ease of understanding but are discussed together to better understand the implications as a whole.

Results from focus group discussion on teacher attributes

The first research question was to understand, through the focus group, student's perception of different teacher attributes that have helped them in their learning journey in school. The Diamond 9 ranking and the rationale for the ranking of each attribute also points to their relative importance from the perspective of students with SEN (mainly dyslexia, in this study). The final ranking by the focus group of the nine teacher attributes are shown in Figure 6 below.



Figure 6: Final ranking of teacher attributes using Diamond 9

Several observations from the focus group discussion helped to enhance our understanding of the priorities of students with SEN on teacher attributes in the mainstream school as well as how the final rankings were derived.

Respect

Respect was unanimously ranked first by the students in the focus group. One of the students mentioned that this is a fundamental attribute because:

'if a teacher does not treat all the students with respect, then he or she will not show any of the other attributes like caring or patience, which are also important attributes to have in a teacher.'

Students pointed out that they are especially appreciative of teachers who respect every student's viewpoint and contribution and do not immediately judge a student's ideas even if the student has learning difficulties. Students with SEN may view things differently, and providing a conducive environment in which they can freely participate and focus on learning instead of worrying about their differences is important to them. Another student shared that her English teacher is aware that she needs more time to read relative to her peers due to dyslexia, and always gives her additional time to do so. By allowing the student to read at her own pace, she was able to comprehend the passage better. All the students see a direct link of this teacher attribute to better student outcomes.

Caring

Having a caring teacher is also highly appreciated by students as it is ranked second by the focus group. Caring teachers make students feel included in class activities instead of feeling left out or ostracised. One student mentioned that at an age where students are undergoing several major transitions in life (primary to secondary school, puberty etc.), having a caring teacher gives them the assurance that 'someone is there when I needed help or support'. Secondary students do spend a major part of their socialising time in the Singapore school system. Thus, having an adult in school who takes the time to listen to their problems, be it academic or social, makes them feel that they are not alone.

Another student mentioned that he is more willing to ask questions in class when a teacher is caring or approachable as he is relatively shy and awkward. Students added that caring teachers are also better able to manage students with anger management and coach them on how to handle their anger and frustrations better. They will help these students to be a better person and behave in a more responsible and mature way over time and change their attitudes towards learning in school.

Clarity

This attribute was ranked in the top three as students feel that with so many subjects and topics to learn in school, teachers who are able to explain new concepts clearly are really important for them to understand and do well in school. Providing clear examples to illustrate concepts is an important trait as understanding the concept fully is better than just memorising them. As students with SEN may take a longer time to understand a new concept or are confused by the many subjects in school, having a teacher who can explain clearly is very important to them for their learning in school.

Patience, Humour and Individual

These attributes are still relatively high on the ranking as students feel that they are also important attributes that help them achieve better outcomes in class. For patience, a student associated it with tolerance where the teacher is able to better tolerate diverse learning behaviours in the classroom due to different learning abilities. Interestingly, humour was ranked first by one of the students in his own individual ranking. He felt that humour can break the ice in the class and help him to remember some concepts better. He shared how during exams he burst out laughing during one of the questions as he remembered the joke that the teacher shared in class and that helped him to recollect that lesson and apply it to the question. The other attribute that was ranked in the middle was Individual - which means treating the students as individuals by understanding their respective strengths and weaknesses. This understanding helps the teacher to be able to know when the student needed more help and which area that the student needs to focus on in overcoming his or her weakness. Teachers with this attribute will also notice when a student is behaving differently and frequently check on him or her. This was the case in the student who mentioned earlier that he was bullied in school. One of his teachers will constantly monitor how he is doing and if he needed help to sort things out with the other students.

Interactive

This aspect was ranked in the bottom three as many students felt it is subject-based, for example Science where experiments are performed during class. Students felt that interactive lessons are relatively important particularly if the learning style of the student is kinaesthetic or has a short attention span. However, he forewarned that class may get disrupted if students start to 'play' instead of focusing on the learning as had happened in his class before with interactive devices.

Praise

An unanticipated response was the relatively low ranking that 'praise' got from the focus group - it received the second last rank. Although many students felt that 'praise' is a

form of encouragement and motivation to do better, they also view it as a subtle way in which 'tokenism' could also manifest. One student mentioned that in a class competition, everyone got rewarded, not just the winners. This is because the teacher wanted everyone to feel included but she thought it was 'simple-minded' as some of the students got rewarded for 'doing rubbish work'. Another student also felt that much of the praise were not sincere as she generally gets it for her weakest subject. She will still get praised even though she flunked her subject as her teacher wanted to 'encourage' her.

Goals

Coming in as the last ranking attribute is 'goals' or goal setting. It was a unanimous decision for the focus group. The students shared that goals and target setting are generally adult-driven, either by their parents or teachers. They also commented that the goals are basically the same year-in-year-out and one of the students likened it to 'New Year's resolution' where 'it is basically the same every year and nobody achieves them or forgets about them once it is done'. Reviews of goals are also not frequently conducted and normally only at the end of the year when it is too late to do anything. A student mentioned that in her school, the review was done with her parents so she does not know if she achieved her goals or not!

Results from focus group discussion on student outcomes

For the second focus group discussion, students deliberated on how the actions of the teacher have helped them feel more included in the classroom despite their learning difficulty, which leads to positive outcomes. These results can be in terms of either positive academic outcomes or positive social outcomes or both.

As part of the process the students were introduced to the nine student outcomes and was told that they could change or include any other student outcomes they deemed as important that were not in the original nine.

Improve in self-confidence

This aspect was included into the Diamond 9 ranking, replacing 'being competitive and doing better than peers'. The new outcome of 'improve in self-confidence' was not only deemed as important but ended up being ranked as the most important. The critical reason for being ranked first is because the students felt that being self-confident means that at any time, even without help or support from others (especially during the exams or in stressful situations), you have the ability to handle and manage it by yourself. Once you have that confidence in yourself, anything else in life that throws at you, you will be able to manage them yourself. This is an extremely powerful outcome that the students desired most, as irrespective of their learning abilities, they can become independent and self-motivated learners.

Reports showing improvement in grades

Students ranked this second as this is concrete evidence that all the hard work has paid off when reports showed that their grades are consistently improving over time. Students felt that no matter how small the improvement is, it will still provide motivation and encouragement to work harder as it showed they are progressing in the right direction. Another student mentioned that it is a direct confirmation to also show his mum that he is coping well in school as his mum only looks at his academic results to gauge if he is working hard or slacking off.

Feeling good to be at the same level as my peers

The students in the focus group ranked this aspect third. The key reason cited is that 'you do not feel that you are behind or being left out if you are at least at the same level as your classmates'. One student mentioned that as he has a known diagnosed learning difficulty, he is generally perceived to be slower in class and constantly hasto catch up with his classmates academically. He will feel demoralised if he is always at the bottom of his class even though he has worked as hard as everyone.

'Being told by the teacher that I am doing well or has improved', 'having lots of friends' and 'meeting all the set targets and goals' were ranked in the middle of the diamond. One of the student did rank 'being told by the teacher that I have improved' higher as she generally does not know if she is indeed improving. Therefore, being told this by the teacher helps her self-confidence on that subject and motivates her to work harder. On the contrary, another student felt that he should know if he is doing well or not and does not need the teacher to tell him or motivate him.

The most controversial flash card that was hotly contested was 'having lots of friends'. Firstly, it was agreed by all the students to remove the second part of the flash card on 'and likes in social media' as almost all of them do not subscribe to 'likes' in social media as a meaningful measure. However, a gender difference was observed as both the boys put this outcome as their lowest ranked whereas the girls had this outcome ranked as their first. Lively debate ensued and the eventual compromise was to put this card in the middle. The boys argued that friends in school can sometimes be discouraging and look down on you once they know you have a certain learning difficulty. One of the boys, who was bullied in school since he was young, has adapted to being alone in school and does not really socialise with friends. The other boy felt that he is being ostracised in school for being different as the things he like are very dissimilar from his classmates. Both the girls have opposite opinions as they find that sharing and caring with friends in school are what helped them through their difficult times. They found 'true' friendships that have supported and motivated them despite their learning difficulties. The last ranked outcome was 'classmates able to see me do well'. Students felt that at their level, most students are more worried about their own 'survival' than being worried if others are doing well or not. They felt that just getting through the academic curriculum is sufficient reward, given their learning difficulty, so they do not see themselves 'doing well' anyway.

DISCUSSION

Socio-emotional well-being ranked highly

Teacher attributes that took care of the socio-emotional well-being of the students were generally ranked higher. Attributes like 'respect', 'caring' and 'patient' are ranked first, second and fourth respectively. This is consistent with other studies, such as Syrnk (2012), where students with SEN emphasised that a key distinguishing feature of a nurturing teacher is one who is a trusted mentor and is able to establish dependable relationships with students. Similarly, in a study by Shogren et al. (2015), students with disabilities singled out 'patience' as a key teacher attribute that was critical in helping them overcome problems in the classroom. They cited that teachers who are able to recognise and respect that students with SEN learn in a different way, have helped these students to feel more connected to their class and their learning, leading to better student outcomes.

Sensitivity to learning differences

Teacher attributes that distinguish the learning differences of students are also ranked positively higher. Again 'caring' and 'patience', together with 'individual' (i.e. understanding individual strengths and weaknesses), are teacher attributes that students felt allowed them to learn at their own pace with support provided should the need arise. Shogren et al. (2105) reported that students with SEN preferred to be in the same classroom and be included in the same curriculum as they wanted to learn the same things as other students, even if they may need more help or to work harder to achieve the same results as their peers. They repeatedly mentioned that they appreciate teachers who set challenges for them, yet recognise their respective strengths and weaknesses, and encouraged them to be self-driven and resilient.

Gender difference on friendship

There is a major difference in opinion between the boys and girls of the focus group when it comes to friendship. Schwab (2015) found that students with SEN had significantly fewer friendships than their peers. This seems to be true for the boys in the focus group as both of them reported being bullied or ostracised in class, and therefore ranked having lots of friends relatively low. Conversely, the girls in the focus group have ranked this outcome highly, as this outcome is greatly desirable to them. Vignes et al. (2009) confirmed in their studies that girls generally show more positive attitudes to their peers with special needs. This attitude is further enhanced the longer they have been exposed to students with SEN (Goncalves and Lemos, 2013).

Ensuring positive environment for social integration

One of the students mentioned that since he was young, he has been a target of bullying in school. Even though students may tell their teachers about this Shogren et al. (2015) pointed out that victims tend to feel conflicted about reporting the issue as they felt that the bullies may take revenge and make the situation worse. Victimisation by bullying is a serious social issue and affects the social assimilation of students with SEN (Hartley et al., 2014). Therefore, inclusive practices by teachers need to address both the academic and social aspects in an inclusive setting.

Need for a more effective praise and reward system

Both the 'praise' and 'goal setting' attributes were ranked relatively low. This is surprising as studies have shown that both praise and rewards are motivating factors that lead to improvement in student outcomes, and that it is easily accessible to all teachers (Fefer, DeMagistris and Shuttleton, 2016). However, Ferguson (2013) argued that for praise to be effective, teachers need to understand how different students will react to praise and to always bear in mind the intended outcome of that praise. Weber-Stratton et al. (2012) noted that children with special needs often need higher doses of praise and attention but in order for them to be effective, they need to focus on the effort and reward actions and behaviours instead.

CONCLUSIONS

Although there are many studies conducted to demonstrate the importance of teachers to the learning outcomes in an inclusive school environment, very few are from the perspective of students. There appears to be no local research conducted in Singapore whereas studies in other countries are increasingly including students to bridge this gap (Niemi et al., 2015; Clark, 2012). However, such studies need to include students with SEN, since inclusive education and therefore the learning capabilities in the classroom are becoming more diverse.

Results from this study have confirmed that students with learning difficulties could communicate with clarity their thoughts and opinions of their learning journey in school, relating to teacher attributes and student outcomes. The data collected revealed that in terms of teacher attributes, 'respect', 'patience' and 'caring' were ranked highly by the students. With different learning styles in the classrooms, teachers with such attributes are clearly appreciated and students feel more comfortable in such a learning environment.

These attributes were found to be particularly important when the students have low self-esteem. A conducive learning environment is also important for the development of the students as they learn to socialise and integrate with their peers. Unfortunately, students with SEN not only have difficulty generating reciprocal friendships, they may be subjected to bullying in school due to their learning differences (Shogren et al., 2015). Male students in particular cited that strong support by their peers is essential to promote positive attitudes and this is important considering that more boys are being bullied or ostracised in school (Hartley et al., 2014). It is important to overcome this in school before they face more social and relationship issues as they mature into adults.

LIMITATIONS

One of the limitations of the focus group discussion was the possible use of leading questions by the facilitator due to familiarity with his students, especially at the beginning of the process. However, this was needed to start active discussion as many of the students were new to the process and required prompting and help with the way they expressed themselves. This is particularly so for students with SEN who take time to learn and become accustomed to a procedure that they have not encountered before.

It is noted that data analysis for this study is done solely by the researcher. This approach creates a potential for subjectivity and is acknowledged as a limitation of the research. Future studies with a bigger sample size may consider the use of two or more researchers for better inter-rater reliability to overcome this limitation.

Another limitation of this study is the limited sample size which makes generalisation to a broader population difficult. Furthermore, this study was specific to dyslexic learners only. Although dyslexia is the dominant learning difficulty in mainstream schools in Singapore, it is recommended that future research consider including students with other specific learning differences. The situation for students who have not been formally identified and who do not receive targeted support is likely to be even more stressful. It is also interesting to note the divergence between the girls and boys in their response to the importance of social aspects of relationships with their peers. This might suggest that further research should be based on single sex groups, so that no student needs to accommodate their results to fit in with those of a different gender.

Focus group facilitators need to be aware of potential situations where participants are persuaded to be led into a certain direction by a dominant participant (Halkier, 2010). In this focus group discussion, the students were all given equal opportunity to voice their opinions and during the ranking exercise, they were all equally engaged to ensure that the outcome took into account all their viewpoints. It may be for example, that a different set of headings would have generated a different pattern of results.

Directions for further research

In future research, attempts would be made to address the limitations of the current research. Nevertheless, some important implications can be derived from these results, and recommendations made to improve outcomes for students with SEN within the school system. These are outlined below.

The first recommendation is regarding the effective use of praise and feedback in the classroom by teachers. An effective praise and reward system that is specific and focuses on effort and actions can motivate students towards achieving positive academic and social behaviour outcomes (Fefer et al., 2016). Therefore, before teachers shower their students with praise, they need to ensure that the praise is tied to the students meeting progressively demanding standards of performance that enhances their intrinsic motivation in order for it to be effective.

One wide-ranging recommendation from this study is the need to raise awareness and improve interactions between students with SEN and their peers. Students who have regular contact with fellow students with SEN have more positive behavioural attitudes towards their fellow students with disabilities (Goncalves and Lemos, 2013). This highlights the benefits of inclusive settings in school in terms of promoting tolerance to diversity, social acceptance and positive social interactions. Given the nascent development of inclusive education in Singapore, it is even more crucial for teachers not only to be aware of the various learning difficulties of their students but to also provide information so as to improve the attitudes towards students with SEN and assisting in the development of meaningful relationships with their peers.

A related recommendation is training for teachers in mainstream schools regarding specific knowledge and skills to teach an inclusive classroom of diverse learners. Although all government-funded primary schools in Singapore currently have Allied Educators who are trained to support students with SEN, most teachers are not trained to do so. Many teachers in an inclusive setting are not confident of their ability to effectively manage a classroom of diverse learners and therefore felt that they are letting their students down (Robinson, 2017). As such, training has been an area of focus for many educators, especially so that they can build their capacity to engage and support the learning and development of students with SEN. There is an urgent need to better equip teachers in the mainstream classrooms with this knowledge and skills as their attitudes and behaviour do impact directly on the outcomes of their students, as this study has shown.
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Developmental Dyslexia and Compensatory Skills: The man who could not read but learned to fly.

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ABSTRACT

The difficulties that individuals with developmental dyslexia face, makes it challenging to diagnose, to develop appropriate intervention strategies and teach coping and learning skills. However, many individuals with developmental dyslexia develop their own strategies and compensatory skills to cope. An instrumental single case study was used to explore the experiences of a young man, Paul, who had been formally diagnosed with severe developmental dyslexia as a child, with co-morbid difficulties with attention and dyspraxia.

The five dimensions of difficulties or barriers that Paul experienced, and thus where compensation had to take place were explored in this study. These allowed him to develop the strategies, methods and skills necessary to cope with the barriers he faced to become a pilot. Ongoing evidence of difficulties drawn from a screening test, despite the presence of a high IQ level, are also presented to enrich the data, and quotations from interviews included to allow the adult's voice to be heard.

Keywords: Developmental dyslexia, compensatory skills, barriers to learning, learning difficulties, coping mechanisms, instrumental single case study.

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INTRODUCTION

Developmental dyslexia affects between 10 - 17 % of the population, regardless of culture, class or gender, in countries with alphabetical languages (Dyslexia International, 2017; Shaywitz, 1998). This figure has been found to be as low as 3.9 % in countries such as China where people speak and read non-alphabetical languages (Sun, Zou, Zhang, Mo, Shao, and Zhong, et al., 2013). Regardless of the population affected by developmental dyslexia, it has been found that males are more severely affected than females by developmental dyslexia, and are thus more likely to be diagnosed with the disorder. Developmental dyslexia is a life-long, neurologically-based condition that is often inherited (Dyslexia International, 2017; Reid, 2011; Rutter, 2008; Snowling, 2000; Thomson, 2009). The advanced brain scanning equipment available today as well as ongoing brain study research linked to developmental dyslexia has been able to clarify developmental dyslexia as a brain-based, neuro-developmental disorder (Vellutino, Fletcher, Snowling, and Scanlon, 2004). Individuals with developmental dyslexia are at a distinct disadvantage, especially when they have a more severe form of this disability, as they struggle to learn to read, and therefore perform poorly at school. This may lead to several barriers and other co-morbid difficulties that they must compensate for if they are to succeed and pass secondary school.

LITERATURE

Owing to the complex nature of developmental dyslexia and unique combination of traits everyone may exhibit, it has taken many years for consensus to be reached about a universally recognised definition for this disorder. Although most definitions cover similar basics, all agree that developmental dyslexia is a brain-based disorder, characterized by a difference in the way the individual with dyslexia processes information, as the following definition explains:

"Dyslexia is a difference in how children and adults process information. That is, how they take information in (input), how they understand it, memorize it and organize it in their mind (cognitive processing), and how they demonstrate they know this information (output). Dyslexia is often characterized by difficulties in literacy acquisition affecting reading, writing, and spelling. It can also have an impact on cognitive processes such as memory, speed of processing, timemanagement, co-ordination, and automaticity. There may be visual and/or phonological difficulties and there are usually some discrepancies in educational performances" (Reid, 2011, p. 13)

Without early, accurate diagnosis, and relevant intervention programmes, prognosis may be poor because, due to genotype and neurological impairments, the condition is irreversible. The importance of early diagnosis, treatment, and intervention has been stressed as vital to assist many individuals with developmental dyslexia to reach a maximum level of reading competence (Reece, Booth, and Jones, 2016; Spitzer, 2012). It is also important to note that many dyslexic children and adults display a range of co-morbid conditions, with the incidence so high that Kaplan and colleagues (2001) note that comorbidity is the rule not the exception, with at least 50% of children with dyslexia also showing ADHD and or dyspraxia.

THEORETICAL FRAMEWORK

The Information Processing Model (IPM) (Ashcraft, 2006; Anderson, 2005; Ehri, 1995; Frith, 2002; Hunt and Ellis, 1999; Schunk, 2000; Morton and Frith, 1995; Seymour, 1997) was utilised as part of the fundamental theoretical framework or developing theory to underpin this study, as it addresses all the cognitive processes, which influence lexical access, as well as the ability to learn to read successfully and acquire functional reading skills. This may shed light on how individuals with developmental dyslexia compensate through processing information differently, thus learning how to read successfully in many cases.

In addition to the IPM, this study made use of the Causal Modelling Framework (CMF), described by Morton and Frith (1995) and Frith (1997, 1999, 2002) as an additional framework for understanding and discussing developmental dyslexia. The CMF framework was chosen because it included the three primary dimensions in which research on dyslexia focuses namely, the biological/neurological, cognitive/learning and behavioural/educational, as well as the interaction of these three dimensions with cultural and environmental factors. This model appeared to cover the majority of the current research available on dyslexia and seemed to be an appropriate model to conceptualise and explain developmental dyslexia. The IPM mentioned previously, fits within the cognitive domain of the CMF.

AIMS

An instrumental single case study was used to explore the experiences of a young man who had been formally diagnosed with severe developmental dyslexia. Firstly, the various barriers he faced as a result of having developmental dyslexia were examined. Secondly, the compensatory techniques and skills he used in order to learn to read sufficiently in order to pass secondary school, go on to tertiary studies and to realise his lifelong dream of becoming a pilot were also explored. Additionally, the study described how and by whom the male participant with developmental dyslexia was assisted to pass secondary school and go on to tertiary studies. The final aim of the study was to create a new five-dimensional interactive/multi-dimensional model from the results of the study, as well as additional information from the researcher's exposure to other people with developmental dyslexia over the course of the research period, as well as prior to, and after this. The model assists to illustrate the complexity of developmental dyslexia and the difficulty in diagnosing and treating the disorder, as each individual presents with a different set of difficulties or factors. This multi-dimensional model includes: the neurological factors, the intrapersonal factors, the interpersonal factors, the behavioural factors, as well as the emotional factors. This model will be explained in a separate article; as will the explanation of how and by whom the participant was assisted to pass secondary school.

Compensating for Developmental Dyslexia

Reid (2011, p. 3) suggests that "dyslexic difficulties persist even when reading skills improve, and that dyslexia has an impact on all areas of learning". Reid (2011) proposes that as these children go through school, they learn to use compensatory strategies to cope with challenges and can become quite adept at this. However, he does not elaborate on how they go about doing this.

Individuals with developmental dyslexia often make use of individual compensatory techniques, strategies, methods and skills while learning or coping with the various difficulties they face because they have this disorder (Beaton, 2004; Bruck, 1990; Burns, Poikkeus, and Aro, 2013; Corkett, Hein, and Paririla, 2008; Frith, 1986; Nation and Snowling, 1998; Nicolson and Fawcett, 2010; Ramus, 2001; Ramus, Rosen, and Dakin et al., 2003; Reid, 2009; Ullman and Pullman, 2015). Approximately one-fifth of individuals with developmental dyslexia manage to compensate for their underlying learning difficulties and develop adequate reading skills by the time they reach adulthood (Lyytinen, Erskine, Aro, and Richardson, 2006). However, the mechanisms by which this compensation occurs remain largely unknown, and there is little evidence about longterm compensation towards adulthood (Hoeft, Mc Candliss, Black, Gantman, Zakerani, Hulme, et al., 2011). If individuals with developmental dyslexia are able to consciously compensate (CC) whilst reading, as described by Nicolson and Fawcett (2010), through hard work and an act of the will, and thus perform at seemingly normal levels, then, one could assume that they would be highly motivated human beings. Nicolson and Fawcett (2010, p. 64) suggest that motivation holds the key to most human learning, as does allowing the learner to be in control of his or her learning, as well as making learning and interventions relevant and fun.

Although many of these compensatory skills begin at school, not all these strategies are positive or useful. Scott (2004, p. 55) found that

"for the clear majority of dyslexic adults and children, school has been a place of academic, psychological and often physical torture ... school for them, was destructive and humiliating, a nasty degrading experience, sometimes of raw brutality, of which modern society should be deeply ashamed".

These are comments that others in the field have echoed (Alexander-Passe, 2010, 2015; Fawcett, 1995; Riddick, 1996).

Participant

The participant in this study was a 28-year-old South African male, with pseudonym "Paul". He was diagnosed as a child with a severe form of developmental dyslexia. The disorder, which affected almost every area of his functioning, was diagnosed by a clinical psychologist in 1995, when he was 10 years old. A second cognitive test, the Wechsler Adult Intelligence Scale (WAIS, Wechsler, 1997); relevant scholastic tests; as well as the Dyslexia Adult Screening Test (DAST, Fawcett and Nicolson, 1998); were conducted by the researcher to confirm the severity of the developmental dyslexia experienced by Paul for this study; as well as the combination of challenges he faced as a result of his developmental dyslexia. Paul is Afrikaans-speaking, and attended a school where Afrikaans was the medium of instruction. He was taught English as a second language. He grew up in a small town in South Africa, where there were few resources available to children with learning challenges. At the time, very little was known about developmental dyslexia, and his teachers had received no training and thus had limited if any knowledge of this disorder.

Design

The research paradigm was based on social constructivism as described by Creswell (2012, 2013, 2014), Crotty (1998), Henning, Van Rensburg and Smit (2004); Lincoln, et al., (2011), Merriam (2002), Merriam and Tisdell, (2016), and Mertens (1998, 2010); and interpretivism as described by Cohen, Manion, and Morrison (2007). Within the combined constructivist-interpretivist worldview, a qualitative case study research design was used. Qualitative researchers study things in their natural settings, attempting to make sense of or, interpret phenomenon in terms of the meaning people bring to them (Denzin and Lincoln, 2013, p. 7). Therefore, this approach strove towards a more comprehensive, holistic understanding, in exploring, understanding, as well as making sense and meaning of the participants' recollection of how he compensated for his barriers arising from developmental dyslexia, and what compensatory strategies he used (Merriam, 1998, p. 75). A case study design was chosen as the appropriate qualitative design for this study, as it enables the researcher to understand a real-life phenomenon in depth; in context; relies on multiple sources of data or evidence. This data needs to converge and must be triangulated (Creswell, 2009, 2012, 2013, 2014; Mertens 2010; Stake, 1995, 2005, 2006; Yin, 2009, 2012, 2014).

METHOD

The data collection methods included two phases, namely, semi-structured interviews and collection of other collateral information. This was followed by verification of the data and data analysis. Data analysis commenced immediately after the first data was collected and was used to form the subsequent data.

Initially a multiple-instrumental case study of five male participants was described. However, the design was changed to a single instrumental case study design (Creswell, 2009, 2012, 2014; Geering, 2007; Mertens, 1998; Rule and John, 2011; Stake, 2006, 1995; Thomas, 2011; and Yin, 2009, 2012); where a single male participant was chosen, as Paul's data was more detailed than any of the other participants. An instrumental case study design allows for "thicker, rich descriptions", greater depth and understanding of developmental dyslexia within its real-life context, its contexts scrutinized, and activities detailed (Creswell, 2012, p. 465; Rule and John, 2011, p. 4 and Stake 2005, p. 445).

Data analysis

All data collected was analysed by using a six-phase thematic analysis method as described by Braun and Clarke (2006). Thematic analysis was conducted from a constructivist perspective; where meaning and experience are socially produced and reproduced; which does not seek to focus on motivation or individual psychologies, but instead seeks to theorize the sociocultural contexts, and structural conditions, that enable the individual accounts that are provided (Braun and Clarke, 2006, p. 85). Thematic analysis is a method for identifying, analyzing, and reporting patterns or themes within data. It minimally organizes and describes the data set in rich detail (Braun and Clarke, 2006, p. 79).

FINDINGS

The five dimensions of difficulties or barriers that Paul experienced, and thus where compensation had to take place, in order to allow him to develop the strategies, methods and skills necessary to cope with the barriers he faced, were identified according to the five dimensions explained previously.

Dimension 1: Biological and Neurological factors

Due to the fact that Paul did not undergo any scans, it is virtually impossible to comment on or to draw many concrete conclusions regarding the biological or neurological factors that may have affected him. Paul had a genetic vulnerability and probably inherited developmental dyslexia from his father and grandfather, as both had very similar reading and other difficulties to Paul. However, neither was officially "diagnosed" as having developmental dyslexia. Pennington (1999) suggested that if one parent is dyslexic that 50% of the children inherit this vulnerability. Gilger, Pennington and De Vries, (1991) estimate a slightly lower risk of 40%. Paul may have inherited the dyslexia via a combination of complicated and varied factors, but mention of any particular factor without evidence of such would be pure speculation. As a male he had a higher risk of having a more severe form of developmental dyslexia (Rutter et al., 2004). There was nothing that could be done to prevent Paul from inheriting the developmental dyslexia which is a brain-based neurodevelopmental, life-long condition (Frith, 2002). The disorder, which affected almost every area of his functioning, was diagnosed by the clinical psychologist in 1995, when he was 10 years old and verified for this research by the Dyslexia Adult Screening Test (Fawcett and Nicolson, 1998).

However, Paul also inherited the cognitive potential for success, as the maternal side of his family were and are successful academic achievers in their respective fields. The importance of early diagnosis and intervention (Hulme and Snowling, 2009; Reid, 2009; Stein, 2008), and the fact that Paul was only diagnosed at age 10 means that he started at a "disadvantage" as a result of a late diagnosis (Elbro, Nielson and Pietersen, 1994; Reid, 2011; and Wise, Ring and Olson, 1999). On the continuum of developmental dyslexia from mild to severe, Paul has severe dyslexia.

Although visual stress is a complex and often controversial topic in the field of developmental dyslexia, it is appropriate to mention here that Paul was prescribed dark green glasses to assist with reduction of glare which he has found does affect him negatively as can be seen in the quotation that follows. To compensate for this, Paul saw an optometrist when he was in Grade 4, who used a colorimeter to test what specific colour lenses would reduce the glare or visual stress for him. The optometrist was able to prescribe the correct colour lenses which stopped some of the glare of the white paper and black ink that made him feel "blinded". To compensate for visual stress/glare, Paul uses bright yellow paper and writes with dark/black pens for contrast.

"I take the information and put it on yellow paper, it's less intimidating then. Somehow the brain responds to yellow paper, to a yellow background, it's got a calming influence...the white is too glary. I can't identify anything on white, it's just one enormous lump ... it's just one big block ... I can't see (black on white) ... I've got green glasses that I read with, green glass lenses ... from the colorimeter that assists with it ... given specifically from a person that did tests for children with difficulty, with learning disorders (optometrist) ... you get students who one lens is pink and the other one is blue ... also I get headaches if I read too long from a page that's a white page without the glasses. I can't see the letters, it's as if I'm being bombarded with information".

Due to the fact that no scans were conducted and having no access to what was happening in the participant Paul's brain, little more can be described about compensation in this domain.

Dimension 2: Intrapersonal factors

Intrapersonal factors includes the executive control; information processing; cognition; behaviors (which manifest in various learning difficulties); personality and disposition;

co-morbid conditions; as well as internal and personal coping skills.

Paul had to overtly take control of his Executive Functioning (EF) by choosing to persevere. From the beginning he was committed to never giving up and achieved this with help from his mother. He was constantly aware of the consequences of his choices, which took enormous internal energy and courage. Therefore, it is reasonable to assume that Paul adopted strategies which include various adapted executive functions such as planning, shifting and inhibiting skills, which he employed to either overcome his sequential and speed deficits, or to effectively and automatically utilise contextual cues in order to achieve maximal reading performance (Cohen-Mimran and Sapir, 2007; Locascio, Mahone, Eason, and Cutting, 2010).

When Paul was initially diagnosed, his mother gave up full time work and spent every afternoon assisting him to revise the work from the day at school. To compensate in EF, Paul learnt how to plan and organise himself, through the example set by his mother when he was young. Additionally, all his work thereafter was meticulously labelled, colour-coded, highlighted, summarised and rewritten in a form that made it easier for him to learn, understand and move to his long-term memory (LTM). Paul had to learn to plan and study months ahead of any test or examination to prepare adequately to pass and meet the minimum requirements. It took hours of rehearsal, anchoring, and the use of study techniques such as highlighting, acronyms and repetition, to move the work from his short-term memory (STM) to his LTM (Banai and Ahissar, 2010; Fry, 2012; Reid, 2011).

At the sensory level, Paul struggled to absorb information accurately in the visual and auditory form in the brain. He managed to compensate for this through constant rehearsal and, owing to plasticity of the brain, he was able to develop the skills of decoding and functional phonemic awareness (Francheschini, Gori, Ruffino, Viola, Molteni, Facoetti et al., 2011; Pruitt et al., 2016; Reece et al., 2016). This enabled transfer of information from his poor STM and working memory (WM) to his better-developed LTM. (A standardised cognitive assessment was conducted to determine this).

In terms of manifestations of life-long scholastic and literacy difficulties Paul experienced poor literacy skills including poor spelling, reading, word recognition, writing and numeracy skills, which is everything needed to succeed at school. Paul struggled with poor rapid naming speed, and automaticity, which has been linked to cerebellar dysfunction (Fawcett and Nicolson, 2008; Thomson, 2009); as well as poor working and short-term memory skills, which meant he had to repeat work to move it to his long-term memory store. Data from the DAST completed as part of this project will be reported later in this article to confirm and extend these findings, outlining the continuing difficulties suffered as an adult by a child with a full clinical diagnosis of dyslexia.

However, in spite of the above-mentioned learning barriers, Paul managed to learn to read by constant repetition, hard work and drilling in the afternoons with his mother. She made him learn his spelling, sight words and times tables repeatedly. He also had Occupational Therapy (OT) to assist with poor motor skills, and extra lessons right through to secondary school. He was able to pass Grade 12, and gain entrance to University. Paul compensated by using various studying techniques to assist him. Although he was able to recall the facts through visual and auditory anchoring techniques, he had trouble applying, and comprehending the work, including understanding or interpreting what the questions required of him. Paul discovered through experience that to comprehend what he was learning he needed to see the bigger or whole picture and then fill in the details, so that he could make sense of it. Paul also struggles with poor sequencing ability.

In addition to developmental dyslexia and the associated learning difficulties, Paul was diagnosed with several co-morbid conditions which included attention deficit hyperactivity disorder (ADHD), dyspraxia or poor motor skills, anxiety, and depression. He also struggled with long-term trauma and sexuality issues.

In Grade 4, Paul was diagnosed by a Clinical Psychologist with ADHD, a common comorbid condition found in children with developmental dyslexia However, the methylphenidate (Ritalin) prescribed at the time, to assist with concentration and attention had an adverse reaction to this, so it was discontinued.

Paul struggled from Grade 1 to develop automaticity, the automatic development of basic skills, including motor skills (Nicolson and Fawcett, 2010). His co-ordination, and fine motor skills were poorly developed, and he tended to be clumsy. He attended years of OT to address poor fine motor co-ordination, which assisted him in the long run owing to the formation of new brain pathways and intensive early intervention (Francheschini et al., 2013; Pruitt et al., 2016).

"It affected my balance, my co-ordination, my reading, my spelling, my writing, my ability to learn and remember, my spatial skills, and just about everything else including my self-image and emotions. I had to have extra classes in everything as well as aarbeidstherapie (Afrikaans for occupational therapy) ... I was special ... AKA ... DUMB!!!".

As he got older, he compensated by writing in capital letters so that his work was more legible. This avoided reversals and confusing of upper- and lower-case letters. This was an interesting compensatory technique that Paul used as there is documented evidence that for children with dyslexia, it is easier to teach them the upper case letters first, as there is less chance of reversals (Davis and Braun, 2010).

During his adolescence, Paul had difficulty with interpersonal skills, and admitted that he was always aware of the fact that he was not attracted to girls and yet he did not particularly prefer boys or men. This may have been his way of compensating for the

bullying, teasing and other emotional difficulties he faced at the hands of many of his peers, especially the boys. He tended to avoid relationships and spent so much of his time studying, he had no time to learn appropriate social skills and develop his sexuality appropriately. Due to poor motor skills and resultant clumsiness, Paul could not handle a ball and thus did not take part in rugby which was expected of boys in his school. He had an affinity for music and learnt to play the piano, which further isolated him from his peers, and added to the insults and teasing he endured. Paul reported that he does not remember anything about his adolescence. He spent all his time studying just to pass at school, missing out on a "normal" childhood and adolescence. Most days, school was not a pleasant place for him as he felt he did not fit in and was often bullied and abused (Alexander-Passe, 2010,2015; Scott, 2004).

"I wasn't good with anything at school and then also again your self-esteem evaporates, it disappears. You can't do sport, you don't like sport, well after a while you say you don't like sport ... because you do bad at it ... I'm not such a sporty person ... but you're missing out again ... on the sports field you learn to engage fellow students, you build interpersonal skills ... I didn't have this from Grade 1 to Grade 12 ... I built these walls around me to keep them away from me ... the boys never understood because I was the only boy in a class in an Afrikaans high school in the countryside that didn't play rugby ... so automatically there's a whole stigma that clings to someone that doesn't play rugby".

Thus Paul struggled to develop appropriately on a psychosocial level (Erikson, 1950, 1963), due to extended hours spent trying to cope with the demands of passing school. However, what did develop fully was his occupational identity (Erikson, 1950, 1963) and this is what drove his success. Paul always had the dream of becoming a pilot. He had the end goal in sight as a young boy and he never took his eye off the prize. This was one of Paul's most important compensatory skills which kept him going despite the emotional and educational challenges he faced.

"I never forgot the end goal".

Paul displayed a number of personality traits or characteristics which assisted him to manage and compensate for his barriers to learning, in order to pass secondary school and then go on to achieve success in his tertiary studies to become a pilot. Some worked to his advantage and could be strengths such as tenacity, the ability to work hard, a competitive nature and a good sense of humour. Other personality characteristics may be perceived as challenges for Paul, which made it more difficult for him to cope, such as the tendency to procrastinate and having a shy, retiring nature. Paul managed to cope successfully and effectively in a stressor rich environment, shape acceptable resolutions to difficult circumstances, and not only survive, but mature and thrive in the face of difficulty and hardship.

Dimension 3: Interpersonal barriers

This third dimension includes factors or barriers that are external to Paul and that he had to compensate for because of having dyslexia. Paul experienced many difficulties which made his schooling challenging. Prior to his original assessment, he told his Grade 4 class teacher that he was going for an assessment for dyslexia. Her response was "What's that, wat is fout met jou? (What is wrong with you?)". When he returned with the report from the Clinical Psychologist, the teachers did not know what dyslexia was, or how to assist Paul. He experienced difficulties because the principal and teachers had no exposure to developmental dyslexia in their teacher training, and they were thus not able to assist with remedial therapy.

After he received the dark green glasses to assist him to reduce the visual stress, the other children would then wear dark glasses to mock Paul. When the teacher asked them to remove their dark glasses, they would say that he wore dark glasses in class and would tease him. The lack of support and ignorance from the teacher made him feel humiliated and vulnerable, as she did not stop the teasing.

"They would say I was a freak and looked like a dragonfly ... the teacher would make them take the dark glasses off, but she never stopped the teasing ... it was humiliating".

Paul experienced language difficulties, especially at secondary school and later at tertiary level, as his first language of learning was in Afrikaans which follows consistent patterns of spelling and grammar. When he studied to become a pilot, at tertiary level, Paul had to learn in English which follows totally different sounds and patterns to Afrikaans, which would have further confused him and made his barriers even more difficult.

The cultural, family and psycho-social difficulties that Paul experienced made it even more difficult for him to succeed. Paul came from a small town where his family was well known. All the female members of the maternal side of the family were academically strong. Paul was always aware of the fact that he was academically weak and afraid that he would bring "shame" on the family.

Dimension 4: Emotional barriers

Paul developed high anxiety levels, depression, was continually frustrated and struggled with poor self-esteem. He describes feeling in constant pain and anguish. He also had to overcome resentment as well as jealousy of his peers and siblings, as he had to spend all his time after school studying, at OT or extra lessons, while they could play, attend sports, extra murals or have fun.

However, he learnt coping mechanisms and was able to distance himself from the emotion by focusing on one thing at a time that he had to study, and thinking of nothing else, as he called "compartmentalizing".

"Well now I realise that it was all for the greater good and I'm not really bitter. I just, I was able to now distance myself from the emotion and deal with every step of the emotion and different kinds of emotion ... and identify the coping mechanisms ... that's what they were ... they were coping mechanisms. They are not long-term solutions to anything".

Making use of the coping mechanisms or compensation skills Paul used such as focusing on one thing at a time or "compartmentalising" whilst he studied or "pretending to be an ostrich" and hiding away from the reality of how difficult it was for him to study and how much work there was to do; ensured that he passed secondary school in the end. However, Paul described how he struggled to feel whole and integrated as a person on many levels, especially emotionally.

Additionally, Paul explained how he felt constantly traumatised from the time he was first diagnosed with developmental dyslexia, to the present time. These feelings are explained by Van der Kolk (2015), who proposes that trauma and its resulting stress harms people through physiological changes to the body and brain. This harm can persist throughout life, predisposing us to ongoing mental and physical health issues, employment, and education, relationship, as well as possible substance abuse and trust issues. However, Paul had the support and care of his mother when he was growing up and through adolescence and then sought the assistance of a psychologist and psychiatrist as an adult. He could not "run away" from the teasing, bullying, and resulting trauma of having dyslexia. This again speaks to Paul's ability to effectively cope in a stressor rich environment and the resilience that he developed (Strümfer, 1995; Wissing and Van Eeden, 1997). Paul learnt to shape acceptable resolutions to difficult situations and not only survived but matured in the face of difficulty and hardship (Moss, 2002).

The constant trauma Paul experienced led to a poor self-image, poor self-worth, as well as a feeling of not being able to do anything as well as his peers, and never feeling good enough. Paul explained throughout the interviews how having developmental dyslexia had a negative emotional impact on his life. At times he felt that he was so overcome by emotion that he was not even sure who he was anymore. He had to learn to cope with the constant fear of failure (Alexander-Passe, 2010,2015; Scott, 2004). This meant making a "mind shift" and trying to ignore the fear, so that he could study and learn the work daily.

Paul reported that after attending therapy as an adult, he learnt to face up to the reality of having dyslexia, and realised he could not run or hide from it. He began managing the trauma caused by having developmental dyslexia by working through it in the therapy sessions. During the interviews, he realised how many coping skills and compensatory strategies he had successfully implemented to pass his examinations and cope with life.

The psychiatrist Paul saw in 2011, made an accurate diagnosis of dysthymia, which is a long-term underlying depression that Paul had been struggling with for years. Paul explained that the depression or dysthymia became so much a part of him that it felt like a constant "dark-grey cloud" over him for years. He referred to the depression as a cat that used to take over his lap and grow or shrink depending on how bad (depressed) he felt at the time. Sometimes the cat would grow so large he felt that it was smothering him. He even had a name for the cat as described in the quotation that follows.

"It's very dark, again, I used to describe depression as a cat that used to jump onto my lap. I had a name for it, you know, Felix. Maybe him and dyslexia were wellacquainted. ... it's a constant presence, there's always something there ... I think they (depression and Felix the cat) do feel one another"

Paul never understood what depression was until he was officially diagnosed by the psychiatrist. He received medication (anti-depressants) for the first time, which lifted his mood and he started feeling better within a month. Besides depression, anxiety and trauma, other emotions described by Paul include fear, shame, anxiety, loneliness, feeling isolated and excluded, self-doubt, poor self-esteem, helplessness, and worthlessness.

"The characteristics of dysthymia ...It's like an ivy, so it grows slowly, it manifests slowly, so it's difficult to detect, but once it is there it's difficult to get rid of because by the time you realise there's a problem it's been continuous for such a long time that it becomes you ... so again you've got a lot of trauma to deal with. Pain, pain, pain and pain. You can't do anything. You can't grow until you've addressed the cause of the pain"

Figure 1 and 2 show Paul's views on fear and anxiety. His writing in capital letters can be seen here as well.

Paul succinctly describes his continual emotional struggle with developmental dyslexia with the following words:

"It's like you're climbing a hill being dyslexic and you're carrying big bags of sand or rock.... plus there's a rope that's pulling you back down the hill ... and you need to carry on climbing and climbing. The hill is the work you have to study for the test or exam... you need to get to the top of the hill for the pass before you get so exhausted by everything else that's pulling you back, the emotional ummm



Figure 1: Paul's views on fear

RAID: WHEN I EXPERIENCE THE SELF DOUBT WHICH LEADS TO AVOID HICE AS I MIGHT FIND I AM NOT AS KNOWLEDGE ABLE ON EG. AN AVIDTION TOPIC AS SHOULD BE I BECOME AFEATA THE FACT THAT I DON'T know something makes me FEEL AFEAID OF FAILURE. AFRAID OF UNDERPERFORMING AND AFEATO THAT OTHER PEOPLE MAY FIND OUI I DONT KHOW. THE FEELING OF BEING AFEATO OF SOMETHING I DONT KNOW MAKES ME EVEN MORE AFRAID AS I FEAR I MIGHT NOT undeestand

Figure 2: Paul's views on anxiety

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stuff.....that you just give up and just fall backwards because you know when you get to the peak you'll just get 50 or 40 or 45 (percent) or whatever. It's never really wow something absolutely magical"

Dimension 5: Behavioral barriers

Paul had received a number of formal diagnostic assessments, including most recently the Wechsler Adult Intelligence Test (WAIS). These showed that he had an intelligence level in the superior range, comprised of exceptional verbal skills, coupled with average speed of processing, memory, and visual perception.

As part of the assessment, Paul completed the Dyslexia Adult Screening Test (DAST) (Fawcett and Nicolson, 1998,) which revealed a range of ongoing difficulties in literacy, speed, memory and motor skills. Paul now uses Concerta to assist him in some of his tasks, and although the OT taught motor skills, Paul prefers to swim and exercises at the gym. There are still residual motor skills difficulties which he has not been able to compensate for as he still cannot catch a ball properly. On the DAST Paul scored in the very high-risk range (–) or bottom 5–11% for his age range for postural stability, meaning that he still has residual difficulties with balance and thus possible cerebellar abnormalities. Poor automaticity still affects reading speed, but Paul has made improvements through consistent practice, but continues to struggle to blend new skills into existing skills, as predicted by the ADHD and dyslexia.

Through intensive remedial therapy, constant rehearsal and drilling of spelling and reading skills, Paul learnt to decode, as well as to read, write and spell most of the familiar words in English and Afrikaans. However, as seen on the DAST nonsense passage sub-test he still exhibits residual phonemic difficulties with unknown words as he was only able to decode 8/15 unknown nonsense words in the passage correctly. He made no mistakes with the known words. His reading pace was slow on this DAST sub-test, but his accuracy was perfect. Paul scored in the very high-risk range or bottom 5–11% for his age range on this test.

Paul's areas of greatest weakness was shown to be in the DAST rapid naming sub-test, where he scored at extremely high risk (–) in the bottom 4% of his age range. He can name objects accurately but due to poor rapid "direct access" to words he needs time to do this. When he is rushed or interrupted, he becomes anxious, flustered, or loses concentration. Paul has found that since he started on the Concerta and is aware of this weakness, that if he uses "conscious compensation" skills when reading (Nicolson and Fawcett, 2010, p. 68), slows down, and deliberately tries to focus better by ignoring external stimuli; that with practice and a quiet environment, it becomes easier for him to manage better.

Additionally, through consistent practice, drilling and moving the whole words (sight words) to his long-term memory store, Paul has been able to speed up his rate of reading. Through extensive remedial therapy he also learnt to decode and break up words into syllables and sounds and improve his phonemic awareness sufficiently to compensate for this weakness. This is still not sufficiently fast to class him as a proficient reader. However, through hard work and using compensatory skills over the years, his accuracy is sufficient so as not to affect his comprehension of what he reads, as he is able to read at a functional level.

On the one-minute reading test, Paul read with perfect reading accuracy, but his reading speed was fairly slow. He scored within the very high-risk range (-) which is in the bottom 5–11% of people his age for reading rate when he read single words. This is due to taking a longer time to decode words accurately. He reads through the work many times, highlights the work, tries to make visual pictures and charts and flow diagrams of the work, as well as realistic looking pictures or takes photos of the real items to add to the explanations.

Thus the two areas that were the weakest on the WAIS cognitive test, his processing speed as well as his STM and WM, Paul still struggles to compensate for today. To cope, he must compensate by drilling, rehearsing and working up to twenty times longer to move the work he has to learn to his LTM store. Although his WMI on the WAIS was still within the normal range, this was well below the superior score he obtained for his verbal skills. The DAST confirms that his working memory is within normal ranges for his age as Paul scored in the average range for his age (0) which is between 13–77% of the individuals his age for the backward span sub-test. Paul's comorbid ADHD also affected his memory and after he started taking the Concerta this improved his concentration and he found he was able to focus for longer periods of time and it did not take as long to move the information from his STM to his LTM.

Paul has developed reasonably good phonemic awareness and so the spelling mistakes he does make are still phonetically correct. For example on the DAST he wrote "adress" for "address" and "sucess" instead of "success" so they were both phonetically correct and one could still make out what word Paul was trying to spell. Paul scored in the very high-risk range (-) on the two-minute spelling test on the DAST which is in the bottom 5–11% for his age group. This confirms that he still has residual spelling difficulties even after years of remedial therapy and drilling.

Paul has compensated for poor spatial skills ability and mixing up of upper- and lowercase letters by writing in capital letters only. On the DAST Paul fell into the high-risk range for the one-minute writing test (-), which is below average and in the 12–22% range for his age group. He writes fairly slowly as he takes time to copy accurately. He feels that accuracy is more important than speed. His handwriting is neat and legible which is not the case with many people with dyslexia, which means that the fine motor control work that he did with the OT has paid off. Paul has found that his verbal expression is far superior to his written expression. This is confirmed by his superior scores on the WAIS verbal scales. However, he did obtain a distinction for English (Second Language) and a B symbol for Afrikaans (First Language) in Grade 12, which is an exceptional achievement for a learner with developmental dyslexia.

Paul does have difficulty interacting on a social level with others, but this is more because he is shy, introverted and he is afraid of rejection. He showed superior ability on the WAIS on the comprehension sub-test which reveals good knowledge of social norms and expectations. However, because of bullying and poorly developed social skills and very little interaction with his peers when he was at school, he had to develop these skills at a much older age when he left school.

Paul admits that he tends to "use people" sometimes which is a coping skill, but he is learning to trust people more, as he develops and grows more confident. He compensated for many of the emotional and social difficulties that he experienced by attending therapy with a psychologist, being diagnosed by a psychiatrist and taking the correct medication, learning to take care of himself (self-care) by listening to soothing music, exercising, playing with his dogs, using fantasy and escapism and through drawing spiritual strength through his faith in God.

Paul struggled with visual and auditory processing difficulties. These he learnt to compensate for by rehearsal and drilling of sight words, learning similar sounding and looking words off by heart and moving them to his LTM, as well as taking Concerta to assist with attention and concentration. He has compensated and managed to improve his ability to differentiate similar sounding words and is as fluent in English as he is in his mother tongue Afrikaans by listening to the British Broadcasting Corporation (BBC) and exposing himself to as many different mediums as possible so that he can speak with the correct English accent, as well as use the correct pronunciation and intonations. This is in spite of the fact that Afrikaans has a shallow orthography compared to English, which makes English a far more difficult language to learn to read, write and spell.

Paul has above average, well-developed verbal and semantic verbal fluency skills. He scored in the above average range, or top 23% for his age on these two tests on the DAST. This is confirmed by Pauls' superior verbal skills on the WAIS. Paul uses his superior verbal skills to compensate for his poor memory, reading, spelling, and writing skills.

Paul scored in the average range for his age on the DAST for the non-verbal reasoning sub-test. This correlates well with the block design and matrix reasoning sub-tests on the WAIS which were both in the average range for his age. His overall perceptual reasoning score on the WAIS was above average.

Using compensatory strategies to achieve his goals

How was it possible with the continuing issues with his literacy skills for Paul to attain the levels of skill necessary for a pilot? This can be attributed largely to his motivation to succeed in this field, which led him to commit himself to extraordinary compensatory strategies in order to be ultimately successful. It's important to note that he is likely to need these skills throughout his life.

In Figure 3 below, is a picture of how Paul wrote or printed all his notes onto yellow paper, to reduce visual stress, and wrote with dark/black pens. This contrast along with



Figure 3: COMPENSATORY TECHNIQUES:. Use of dark green lenses to reduce visual glare; as well as black ink printed on yellow paper with bright red lettering as an acronym to assist learning



Figure 4: Compensatory technique: Use of visuals/diagrams, colour, sequencing, repetition, and multi-sensory approach.

the green lenses assisted him to learn more easily. If he wanted something to stand out, he wrote in red.

Paul runs through the complicated sequences he has to learn as a pilot such as pre-takeoff or landing sequences both visually and verbally. Figure 2 is an example of how he learns a complicated take-off and landing sequence. This assists him to remember the work better when he has to write an examination, when he is in the flight simulator, or in an aircraft flying. He is able to visualise the sequences as he had verbalised and rehearsed them 20 to 30 times over during the learning process (Pruitt et al., 2016). The sequences to be learnt are copied onto the yellow paper. The correct contrasting colours that suited him were found through a process of trial and error.

Figure 4 shows how Paul makes use of different colours to highlight the sequence of events and the role of the pilot (PM in black), the co-pilot (PF in red) and the air traffic controller (highlighted in green) in the sequence of events. This helps Paul to anchor his learning and enables him to commit the procedure and sequence to his LTM. This method helps to limit discomfort or visual stress (Evans, 2001; Reid, 2009; Wilkin, 2003) and enables his brain to remember more easily what he has learnt/studied. The visual allows him to see at which point in the landing or take-off sequence the commands and actions need to take place. He rehearses the sequence taking on the roles of the three different people using different voices, as if acting out a scene from a play, which further enhances his learning as he is now using a multisensory approach, using his sight, voice, hearing and body (Oakland, Black, Stanford et al., 1998; Reid, 2011).

After repeating this 20 to 30 times he is able to remember, by moving the sequence to his better developed LTM and is able to visualise the entire process with the colours, off by heart as needed, as the brain forms new pathways due to plasticity (Pruitt et al., 2016). In other cases Paul uses numbers along with the visuals and colours to learn a set of landing, take off or any other sequences. This is one of the most remarkable compensatory techniques Paul uses, which has made one of the biggest impacts on his learning and ability to pass, even though he never learnt to do this at school. Through trial and error and working out what suits his brain and ability to remember best, Paul has managed to find a study method that is extremely effective for him.

Paul continues to use green glasses to cut down on visual glare and copied all his notes onto yellow paper as the black ink on white paper made it difficult for him to see the words. He highlighted important words in red and used various colors to differentiate between his voice (co-pilot at the time) and the pilot when writing out, or drawing diagrams of landing and other sequences. These compensatory skills he learnt through trial and error or by watching You Tube videos.

"This manual here with the white (paper) is kind of like almost invisible...I can't see the letters, it's as if I'm being bombarded with information". Paul had to learn how to organise, plan and work out time slots well in advance to ensure that he gave himself sufficient time to get through all the work he had to study as it took him twenty times longer than his colleagues at flight school and at the airline. Paul had to figure out his own study skills and methods as he had always relied on his mother up to Grade 12.

Due to the ADHD and his tendency to procrastinate, he had to become self-disciplined and force himself to study and learn even when he was exhausted, as well as keep the goal in mind. Paul compensated by CC and will-power as he wanted to earn his pilot's license more than anything else in the world.

"I don't know how to make summaries I don't know what's important and what's not".

This is closely linked to automaticity.

Paul struggles to this day to write properly. He compensates for mixing upper- and lowercase letters by using all capital letters if he must write, but prefers to use a computer with a spell check. He still hesitates now and again regarding left and right but "writes with his right hand" so that is how he differentiates. This is important as he must make quick decisions regarding direction in the cockpit. He still cannot tell the time properly on a clock with numbers so uses a digital clock. Given enough time he can accomplish this functionally, but it takes longer as he has never automatised this skill. His balance is still poor as shown on the postural stability test on DAST.

For his pilot tests and examinations, all tests are conducted on the computer, so he compensates for poor spelling by using the spellcheck. This means that spelling is not an issue for him. Most of his examinations are multiple-choice questions so he has no need to spell. However, many of the choices have similar looking words with totally different meanings so he tries to learn the answer to the questions off by heart, again trying to shift the work from his STM and WM to his LTM store. This takes 20 times longer than for a person without dyslexia. If he does have to write, his spelling errors tend to be phonetically correct. In Grade 12 he was granted a spelling concession, so spelling was not counted against him during tests and examinations. He refused any accommodations for his pilot examinations and insisted that he would manage these "the hard way" on his own, as he did not want to be seen "as different". This was in spite of the Civil Aviation Association being willing to make allowances for him at the time this research was conducted.

Whilst studying to become a pilot, Paul had to learn take off, landing and other sequences. To accomplish this, he took actual pictures of the cockpit or copied and cut out the pictures from the manual and placed them onto the yellow paper. He wrote up the sequences in order, accompanied by pictures so that he had the visuals and the



Figure 5: Compensating by using picture and sequences

written instructions alongside one another. Examples of these are shown in Figures 3, 4 and 5.

He received a flight manual from the airline, which is called a "Flight Standards Manual", and in the aircraft every procedure is followed word-for-word. There are precise words that must take place between the captain and the first officer (Paul at the time). This meant that he had to commit every word to his long-term memory, or he would have failed when placed under a stressful situation in the simulator when being tested or in an aircraft when flying. (See Figure 2 for an example).

Paul's organisational and time-management skills, as well as his summarizing techniques have always been poor as is common in people with developmental dyslexia (Davis, 1992; Reid, 2011; Thomson, 2009). He often felt overwhelmed by the volume of what had to be done and did not know where to start. Without the assistance of his mother, he has since learnt to use highlighting and organisational skills such as coloured tabs for indexing effectively for his own purposes. He has become adept at learning procedures off by heart and has managed to memorise the entire flight manual with pictures, as well as verbal and visual rehearsal techniques (Fry, 2012).

Paul cannot remember events or sequences out of order and must run through the sequences step by step. One of his greatest strength areas and compensatory techniques is that he can learn the flying sequences off by heart. The sequences must be followed "to the letter" so he cannot do anything out of sequence, which he struggles to do. Once he has committed a sequence to his LTM, he has it "forever'. However, if he forgets one section, or if it is asked out of sequence he must start from the beginning. At school in subjects like History he learnt facts well if he could learn the story behind the event and recall it as such. He could recall facts in Business Economics off by heart but if questions were asked out of context or if he had not learnt that section of work and or did not understand the question, he would fail.

"If you give me A and you put G, I can't get to G without running through the sequence of ABCDEF to G".

Saying the word out aloud assisted Paul to remember the sequences as he made use of more of his senses.

"So for me, learning sequences is like learning a script. (The) multi-crew environment in a flight deck is like a play between the captain and the first officer ... I memorise this".

He used drama/play acting as another effective multi-sensory compensatory skill to help him learn.

CONCLUSION

It is important to take note that the barriers Paul faced continued to affect him and resulted in difficulties even after secondary school, as developmental dyslexia is a lifelong, neurological disorder which cannot be fully cured. In Paul's case these difficulties are exacerbated by a number of co-morbid conditions, including ADHD and dyspraxia, as well as emotional difficulties and depression. This means we cannot conclude that all his struggles relate solely to his dyslexia, but they clearly play an important part in his ongoing difficulties. As an adult, Paul had to manage without the support system of his mother and the other professionals, and as a result had to work even harder to develop his own unique strategies to compensate for the dyslexia. He did this without concessions, by choice, for fear of being relieved of his duties as a pilot, although he was entitled to these.

These strategies and skills took extensive time, repetition, the use of colored paper, writing up posters in detail, rewriting all his notes with sequences and diagrams in order to assist learning, using a multi-sensory approach to learning by teaching himself. It is evident from the results and findings of the study that Paul made use of unique compensatory techniques and strategies that allowed him to not only complete secondary school, but also to go on to obtain his pilot's license.

Even though Paul realized his dreams he was subjected to humiliation and isolation, and this resulted in poor self-image as well as depression and anxiety. It is hoped that using the data gathered will assist other people with developmental dyslexia, and co-morbid disorders, as well as those who live with them and assist them, to use or implement some of the successful compensatory strategies used by the participant in this study.

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Phonological Awareness and Phonics Instruction: Inclusive practice that benefits all kinds of learners.

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Abstract

In this article, the importance of knowledge of Phonological Awareness for teaching children in India is highlighted. There is an impressive array of studies showing that a measure of Phonological Awareness in preschool children is a good predictor of their reading achievement in the early elementary grades. Phonological Awareness provides children with skills to become independent readers as well as good spellers. Phonemic Awareness (PA) is the ability to focus on and manipulate phonemes in spoken words. Phonics instruction is systematic when all of the major letter-sound correspondences are taught and are covered in a clearly defined sequence. Poor Phonological Awareness leads to difficulties with decoding, which is seen as a critical factor in successful literacy development. Structured Literacy, which prepares students to decode words in an explicit and systematic manner, not only helps students with dyslexia, but there is substantial evidence that it is more effective for all readers. As phonological processing deficits are a hallmark of dyslexia, children with dyslexia require direct Phonological Awareness and explicit and systematic phonics instruction to learn to read and spell efficiently. Research shows English as Second Language learners benefit from direct instruction in Phonological Awareness and systematic phonics instruction along with alphabetic knowledge. Studies have also stressed the beneficial role of phonological training on the reading abilities of children who come from low-income families.

Keywords: Phonological Awareness, Phonemic Awareness, Phonics, Inclusive practice

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INTRODUCTION

The ability to read is crucial for children's academic success. The importance of success in reading for lifelong achievement must not be underestimated; how well a child learns to read may determine future opportunities, including not only career possibilities, but also his or her ability to accomplish the basic activities of daily life such as reading a newspaper, obtaining a driver's license or identification card, and paying bills.

Every alphabetic language comprises of symbols that represent the sounds of the language. For students who are learning a second language, this principle must be taught directly. Since there is rarely a direct one-to-one correspondence between letters and sounds, students must be taught these sound-symbol associations explicitly. Phonology, the study of the sound structure of spoken words, is the essential foundation upon which language is built, and is a critical element of Structured Language instruction. (dyslexiaida.org/effective-reading-instruction)

Research evidence has suggested that the main reason for the reading difficulties experienced by many children is a problem with phonological processing. Phonological processing is the use of the sounds of one's language (i.e., phonemes) to process spoken and written language (Wagner and Torgesen, 1987). The broad category of phonological processing includes phonological awareness, phonological working memory, and phonological retrieval. Consequently, the learning of phoneme-grapheme correspondences becomes very difficult. According to the phonological representations hypothesis of dyslexia, (Hatcher and Snowling, 2004), these children have incomplete or inaccurate phonological representations of words in their mental lexicon.

As phonological processing deficits are a hallmark of dyslexia, children with dyslexia need to be taught phonological awareness skills directly in addition to explicit and systematic phonics instruction, to learn to read and spell efficiently. Dyslexia affects 1 in 10 individuals, many of whom remain undiagnosed and receive little or no intervention services. (dyslexiaida.org/dyslexia-test). Structured Literacy (dyslexiaida.org/effective-reading-instruction), which prepares students to decode words in an explicit and systematic manner, not only helps students with dyslexia, but there is substantial evidence that it is also more effective for all readers (dyslexiaida.org/effective-reading-instruction).

Being sensitive to the phonological aspects of spoken language, particularly the internal phonological structure of words (e.g., syllables, onsets and rimes), is referred to as phonological awareness (Scarborough and Brady, 2002). Phonological Awareness includes the ability to segment words into syllables, the ability to produce rhyming words, and phonemic awareness. Phonemic Awareness (PA) is the ability to segment words into their component sounds, which are called phonemes (Liberman, Shankweiler, Fischer, and Carter, 1974). A phoneme is the smallest unit of sound in a given language that can
be recognized as being distinct from other sounds in the language. For example, the word cap has three phonemes (/k/, /ă/, /p/), and the word clasp has five phonemes (/k/, /l/, /ă/, /s/, /p/). Thus, Phonological Awareness is a comprehensive term that includes PA.

Poor Phonological Awareness leads to difficulties with decoding (the translation of print to sound), which is seen as a critical factor in successful literacy development. According to Cline and Reason (1993), children who experience language difficulties may place greater reliance on decoding skills. The implication is that English as a Second Language (ESL) children who experience language-related difficulties and have difficulties with decoding will suffer considerable disadvantage when learning to read, because they will have limited compensatory strategies to facilitate the word recognition process.

In India, by and large, children attending schools imparting education in English are ESL learners. The language spoken at the playgrounds is the local language. Students attending elite schools also struggle with reading in grade 4 as most of them come from homes where the main spoken language is not English. India is a multilingual country and according to the 2011 Census, English is the first language of only 0.02 percent of the Indian population. Students from low-income families and deprived backgrounds are at a double disadvantage.

In some children, a delay in the acquisition of phonemes might be due to maturational factors; in others, it might be due to hearing difficulties. Impairment in phonology is said to be the main reason a majority of individuals who are hearing-impaired remain poor readers. In addition, a number of studies have shown that even some children with average hearing have difficulty in recognizing discrete sounds in the spoken language and that these children experience difficulties in learning to read (Aaron, Joshi, and Quatroche, 2012).

The few schools in India that impart phonics instruction do so without Phonological Awareness instruction. Moreover, phonics is restricted to the sounds of the letters. No reading methodology is taught, and the commonly followed reading approach is whole word. Even in elite schools, teachers are not trained in direct instruction in teaching reading. Thus, a significant number of students in grade 4 struggle to read.

Teaching, particularly of literacy skills to children, requires a high level of expertise that comes from professional training. Becoming a professional teacher requires that three conditions are met. The professional reading teacher should possess a thorough knowledge of the foundations of literacy acquisition, have mastery over the application of this knowledge in instruction, and be competent in assessing and evaluating children's progress in literacy acquisition. (Aaron, Joshi, and Quatroche, 2012).

One of the most critical components of implementing effective reading instruction is using an approach that is based on scientific evidence, that is, using programmes and approaches that are proven to be successful. Using scientific research to guide educators to teach children to read and write is essential for ensuring the best academic and life opportunities for our children.

Some students have to unlearn mistakes that have been ingrained by incorrect teaching of, for example, vowel correspondences using cognates which are not accurately matched to the English sounds. Thus, it becomes important for all English teachers to receive training in explicit, structured teaching of phonological awareness, particularly the troublesome vowel sounds.

The importance of professional development to enhance teachers' effectiveness in teaching reading was underscored by the chair of the National Reading Panel (NRP), Dr Donald Langenberg, who is a physicist and was chancellor of the University of Maryland when the NRP was preparing its report. During the panel's first meeting, Dr Langenberg was given a publication by the American Federation of Teachers (1999) titled Teaching Reading Is Rocket Science: What Expert Teachers of Reading Should Know and Be Able to Do. He was especially interested in the booklet because his business is rocket science. Two years later when he presented the NRP report (NICHD, 2000) to the U.S. Congress, he mentioned this book in his speech complaining that the title was misleading. As a physicist chairing this panel for 2 years, he had come to realise that teaching reading is really much harder than rocket science (Hearing on the Importance of Literacy, 2000).

Adams, Foorman, Lundberg, and Beeler (1998), provide step-by-step instructions for developing children's phonological awareness, beginning with listening games and culminating in word identification. Several studies indicate that sensitivity to onsets and rimes is present in preschool children and develops before awareness for phonemes. Onset refers to the initial consonant(s) in a monosyllabic word, and rime refers to the vowel and the consonants following it. For instance, in the words strong, stripe, and straw, /str/ is the onset and /ong/, /ipe/, and /aw/ are the rimes, respectively. In the words would, could and should, /w/, /c/ and /sh/ are the respective onsets and /ould/ is the rime.

On the basis of Wylie and Durrell's (1970) analysis of books used in primary grades, they reported that nearly 500 primary grade words were derived from a set of only 32 rimes. It follows that rhymes can be used to draw children's attention first to the nature of the sounds of words and later to how they can use rhyming features to help them read and spell these words.

Arranged from simple to complex, the components of phonological awareness would be in the following order: identifying and producing rhyming words, identifying words in sentences, segmenting syllables, segmenting onsets and rimes, manipulating phonemes, and blending phonemes. These components are most effectively taught in a similar order.

Phonemic Awareness is the ability to focus on and manipulate phonemes in spoken words. Thus, Phonemic Awareness instruction entails teaching beginners to perform one or several of these tasks.

- Phoneme isolation recognizing individual sounds in words, for example, the first sound in paste (/p/)
- 2. Phoneme identity recognizing the common sound in different words, for example, the sound that is the same in bike, boy and bell (/b/)
- Phoneme categorization recognizing the word with the odd sound in a sequence of three or four words, for example, the word that does not belong; bus, bun, rug (rug)
- 4. Phoneme blending listening to a sequence of separately spoken sounds and combining them to form a recognizable word, for example, /s/ /k/ /ŭ/ /l/ (skull)
- Phoneme segmentation breaking a word into its sounds by tapping...or counting the sounds or by pronouncing and positioning a marker for each sound, for example, the number of phonemes in ship (3 phonemes: /sh/ /ĭ/ /p/)
- 6. Phoneme deletion recognizing what word remains when a specified phoneme is removed, for example, smile without the /s/ (mile)
- 7. Onset-rime manipulation isolation, identification, segmentation, blending or deletion of onsets or rimes, for example, j-ump, st-op, str-ong

There is an impressive array of studies showing that a measure of phonological awareness in preschool children is a good predictor of their reading achievement in the early elementary grades. For instance, a study by Scarborough (1998) obtained a correlation of .46 between a phonological awareness measure at kindergarten and later reading performance. (Aaron, Joshi, and Quatroche, 2012). These studies include instruction conducted in English (e.g., Ball and Blachman, 1991; Bradley and Bryant, 1985) as well as in European languages (e.g., Lie, 1991; Lundberg et al., 1998) A review of 24 studies by Snow et al. (1998) showed that phonemic awareness and phonological awareness scores obtained in kindergarten and reading scores obtained in first grade have a correlation of 0.42, making these awareness tasks moderate predictors of later reading skill. Furthermore, research studies have shown that when children's sensitivity to phonemes is increased by training in phonemic awareness, their reading skill also improves (Ball and Balchman, 1991; Bradley and Bryant, 1985; Foorman, Francis, Fletcher, Schatschneider, and Mehta, 1998; Torgesen, Wagner, and Rashotte, 1997). These results are generally understood to imply a cause-and-effect relationship between phonemic awareness and reading; that is, an awareness of phonemes has a positive effect on reading skill.

Phonics instruction helps ESL kindergartners learn to read more effectively than a whole language approach (Stuart, 1999). Phonics is a method of instruction that teaches students correspondences between letters in written language and phonemes in spoken language as well as how to use these letter-sound correspondences to read and spell words. Phonics instruction is systematic when all of the major letter-sound correspondences are taught and are covered in a clearly defined sequence. This includes short and long vowels as well as vowel consonant digraphs consisting of two letters representing one phoneme, such as oi, ea, sh and th. In addition, phonics instruction may include blends of letter sounds that represent larger subunits in words such as consonant pairs (e.g., st, bl), onsets and rimes.

Several different approaches have been used to teach phonics systematically (Aukerman, 1971, 1984; Harris and Hodges, 1995). These include synthetic phonics, analytic phonics, phonics through spelling, embedded phonics and analogy phonics. Synthetic phonics programmes use a part-to-whole approach that teaches children to convert graphemes into phonemes (e.g., to pronounce each letter in stop, /s//t//o//p/, and then to blend the phonemes into a recognizable word). Analytic phonics uses a whole-to-part approach where children are taught to analyse letter-sound relations once the word is identified. For example, the teacher might write the letter p followed by several words: put, pig, play and pet. S/he would help students to read the words and to recognize that they all begin with the same sound that is associated with p. Phonicsthrough-spelling programmes teach children to segment and write the phonemes in words. Embedded phonics teaches children to use letter-sound correspondences along with context cues to identify unfamiliar words they encounter in text. Analogy phonics teaches children to use parts of written words they already know to identify new words. For example, children are taught a set of key words that are posted on the wall (e.g., tent, make, pig) and then are taught to use these words to decode unfamiliar words by pronouncing the shared rime and blending it with new onset (e.g., rent, bake, jig). Some systematic phonics programmes are hybrids that include components of two or more of these approaches.

Instruction in Phonemic Awareness and systematic phonics is thought to be essential for learning to read in English and many other alphabetic languages. Letters and combinations of letters (graphemes) in the spellings of words represent the smallest units of sound (phonemes) in the pronunciation of words. Phonemic Awareness instruction teaches beginners to analyse and manipulate phonemes in speech, for example, how to Systematic phonics instruction teaches beginners letter-sound (grapheme-phoneme) correspondences and how to use these to decode and spell words. Because the writing system in English is more complex and variable than the writing systems in some other languages, it is harder to learn. This makes alphabetic instruction even more important to teach because children may have difficulty figuring out the system on their own.

Researchers have found that phonemic awareness and letter knowledge are the two best school-entry predictors of how well children will learn to read during the first 2 years of instruction (Share, Jorm, Maclean, and Matthews, 1984).

People used to think that readers learned to read sight words by memorizing their visual shapes. However, research has led to a rejection of this idea. Now researchers know that sight word learning depends upon the application of letter-sound correspondences. These provide the glue that holds the words in memory for guick reading (Ehri, 1992). Becoming a skilled reader of sight words requires knowledge of phonemic segmentation, letter-sound correspondences, and spelling patterns to bond the complete spellings by specific words to their pronunciations and meanings in memory (Ehri, 1980, 1992, 1998; Perfetti, 1992; Rack, Hulme, Snowling, and Wightman, 1994; Reitsma, 1983; Share, 1999). For example, readers learn 'brush' by forming connections between the graphemes b-rush and corresponding phonemes in the word's pronunciation, along with the word's meaning. A skilled reader is able to read familiar words accurately and quickly because all of the letters have been secured in memory. In contrast, a weak reader reads words less accurately and more slowly, and may even misread similarly spelled words such as short, shirt and sheet because only some of the letters are connected to phonemes in memory. Words remain poorly connected when readers habitually guess words from partial letters and contextual cues without analyzing how all of the letters in spellings match up to phonemes in pronunciations (Ehri and Saltmarsh, 1995; Stanovich, 1980).

In Jeanne Chall's (1967) comprehensive review of beginning reading instruction, which covers studies up to the mid-1960s, the basic finding was that early and systematic instruction in phonics led to better achievement in reading than later and less systematic phonics instruction. This conclusion has been reaffirmed in many research reviews conducted since then (e.g., Adams, 1990; Anderson, Hiebert, Wilkinson, and Scott, 1985).

Findings of the National Reading Panel meta-analysis of 38 studies by Ehri and colleagues, (2001), support the conclusion that systematic phonics instruction helps children to read more effectively than non-systematic phonics or no phonics instruction. The impact of phonics instruction on reading was significantly greater in the early grades (kindergarten and first grades) than in the later grades (second through sixth grades).

More direct evidence of the benefits of phonological awareness instruction comes from experimental studies that assessed the impact of such training on word reading. Some of the earliest studies come from Europe. Three research reports (Bradley and Bryant, 1985; Lundberg et al. 1988) indicated that developing children's phonological awareness by using different techniques has a positive impact on word recognition skills. Bradley and Bryant, 1985, provided phonological awareness instruction to British 4- and 5- year-olds through word sorting, rhyming and alliteration activities. Children with the greatest gains in word recognition had been given opportunities to manipulate plastic letters of the alphabet along with the phonemic awareness instruction. The gains in reading-related skills lasted long after the training was over. Lundberg and his associates, (1988), provided phonological awareness instruction to 235 Danish preschoolers through the use of games and songs. They found that the training had a positive impact on children's word recognition skills. Ball and Blachman (1991) and Blachman et al. (2000) also reported that phonemic awareness instruction for kindergarten children from low-income families increased their letter-sound knowledge, their ability to read simple words, and their production of invented spelling.

The beneficial role of phonological training on the reading abilities of children who come from low-income families has been stressed previously (Morais et al., 1998; Morais, 1991). Such pupils are at risk of reading failure especially if they are taught with a wholelanguage approach (Nicholson 1997). It could be argued, according to Eleni Morfidi and Rea Reason, that children who come from a minority group and speak a different language at home may not have experienced linguistic games prior to school. They may come to school with different affective and cognitive characteristics. ESL children who come from English-speaking families. Adult-child interaction in school and educational treatment factors may provide some help, but it may not be sufficient to bring these ESL children to the same level of competence as native English speakers in their early school years. They may be able to catch up later or may still lag behind their peers at later grades.

Hammill's review of studies (2004) reached the conclusion that the greatest impact on children's reading achievement is seen when phonemic awareness training is combined with letter-sound knowledge. Other researchers have also noted that children develop an awareness of phonemes only when they have knowledge of letter identity. In a recent study, Foorman and her associates (2003) conducted a study of more than 4000 kindergarten children and concluded that children who receive instruction in blending and segmenting phonemes, and then explicit instruction in systematically connecting phonemes to graphemes through phonics instruction show the best reading and spelling outcomes in first grade. This is not an unreasonable conclusion, because adding written letters to phonological awareness instruction makes the instruction multisensory in nature and the task more concrete than limiting such training to learning speech sounds. Furthermore, many children enter kindergarten with some knowledge of the alphabet,

and such background knowledge can be profitably utilized in phonological awareness instruction.

According to Adams (1990), the key to phonemic awareness seems to lie more in training than in age or maturation, and the activities that seem to lead most strongly to the development of phonemic awareness are those involved in learning how to read and spell. Alphabetic instruction enables students to write words. As students acquire phonemic segmentation skill, knowledge of grapheme-phoneme correspondences, and familiarity with common spelling patterns, and as they practice reading and writing words, they become better able to remember correct spellings (Griffith, 1991).

Letter-sound instruction also improves spelling performance (Arra and Aaron, 2001; Foorman, Francis, Novy, and Liberman, 1991). In the Arra and Aaron study, 46 children from grade 2 were instructed in spelling by drawing their attention to the phonological basis of their spelling errors (psycholinguistic group). A comparison group of 47 children were shown the correct spelling of their misspelled words without any accompanying instruction (visual group). Posttests showed that children taught through a psycholinguistic and phonemic awareness approach outperformed the visual feedback group in spelling.

The benefits of phonological awareness instruction were replicated multiple times across experiments and thus, provide solid support for the claim that phonological awareness instruction is more effective than alternative forms of instruction or no instruction in teaching phonological awareness, and in helping students learn to read and spell. Effects of phonological awareness instruction were greater under some circumstances than under others. These findings, the meta-analysis of 52 studies by the National Reading Panel (Ehri et al. 2001), support the value of teaching phonological awareness to students. Overall, the findings showed that teaching children to manipulate phonemes in words was highly effective under a variety of teaching conditions with a variety of learners across a range of grade and age levels and that teaching phonemic awareness to children significantly improves their reading more than instruction that lacks any attention to Phonemic Awareness. Specifically, the results of the experimental studies led the Panel to conclude that Phonemic Awareness training was the cause of improvement in students' phonemic awareness, reading and spelling following training. The findings were replicated repeatedly across multiple experiments and thus, provide converging evidence for causal claims. Importantly, the effects of Phonemic Awareness instruction on reading lasted well beyond the end of training. Children of varying abilities improved their Phonemic Awareness and their reading skills as a function of Phonemic Awareness training.

It is essential for students to be able to apply their alphabetic and word reading skills to the reading of stories. Systematic phonics programmes typically provide special texts for this purpose. The texts are written so that most words contain the letter-sound correspondences that children have been taught up to that point. For example, in a text at the easiest level, a large number of words might contain the short /ă/ vowel. At a higher level, all of the short vowels might appear in different words. At an even higher level, several long and short vowels would be present. Additionally, the easiest texts have very limited language and ideas to comprehend, for example, "The cat sat on the mat." As children's word reading skills grow, however, the texts become richer conceptually and more interesting. These are some ingredients of good phonics instruction. There are also practices that are thought to be less effective. One is the extensive reliance on worksheets to teach phonics. This should not be the primary way that phonics is taught. Teachers need to actively teach students, to explain and model the use of alphabetic principles, and to provide practice with feedback.

Another approach that is less effective is to teach phonics as a separate subject unrelated to anything else students are taught during the day. For example, children might study letter-sound correspondences for 20 minutes every morning, and then move to reading and writing instruction that bears no connection to the phonics lessons. Research shows that students will not apply their alphabetic knowledge if they do not use it to read and write (Juel and Roper/Schneider, 1985). The best phonics programme is one that is deliberately integrated with reading and writing instruction.

Systematic phonics programmes might exhibit the very best instructional features. However, if they are not carried out by a knowledgeable teacher, their likelihood of success is diminished. Teachers must understand how to implement a phonics programme effectively and how to plan lessons, and must make sure they are carried out. Teachers must hold expectations about the effects of their instruction on students. They must understand what students should know and be able to do better as a result of their teaching. To verify that their instruction is working, teachers need to use informal testing to monitor students' progress toward the expected accomplishments. Teachers need to understand how to enrich instruction for students who have difficulties comprehending their teachings, and how to scaffold lessons to eliminate their problems. The job of teaching reading effectively to classrooms of students requires a high degree of professional competence indeed.

In this review we have covered the literature on phonology from the early days of Ehri, through to more recent instantiations. So, the question remains, what is the current status of phonology in 2021? Recent research from Snowling and colleagues (Snowling et al, 2019) has confirmed that phonology remains a key underlying problem for children at risk for dyslexia, and therefore one that we continue to emphasise.

To conclude, the goal of making every child a reader is not easy. Educators and policy makers must recognize the place of phonological awareness and phonics instruction along with alphabetic knowledge in a beginning reading programme.

SUMMARY

There is an impressive array of studies showing that a measure of phonological awareness in preschool children is a good predictor of their reading achievement in the early elementary grades. Studies also indicate that systematic phonics instruction helps children to read more effectively than non-systematic phonics or no phonics instruction. Phonological Awareness, beginning with rhyming activities and culminating in word identification, provides children with skills to not only become independent readers, but also good spellers. In India, by and large, students attending schools imparting education in English are ESL learners. Research shows ESL learners benefit from direct instruction in phonological awareness and systematic phonics instruction along with instruction in alphabetic knowledge. Studies have also stressed the beneficial role of phonological training on the reading abilities of children who come from low-income families. As phonological processing deficits are a hallmark of dyslexia, children with dyslexia need to be taught phonological awareness skills directly in addition to explicit and systematic phonics instruction, to learn to read and spell efficiently. Thus, all kinds of learners benefit from direct instruction in phonological awareness and systematic phonics instruction along with alphabetic knowledge taught in a multisensory way.

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Asia Pacific Journal of Developmental Differences

Guidelines for Contributors

Overview

The Asia Pacific Journal of Developmental Differences (APJDD) will be unique in addressing a range of special educational needs including dyslexia, autism, dyspraxia, dyscalculia, ADHD in the Asian context. The journal will cover theory into practice and will provide a showcase for research in the Asian context as well as highlighting research areas which have implications for further research within Asia and beyond.

Frequency of Journal

The Journal will be published twice a year in January and July.

Contributions Considered for the Journal

Primary consideration for publications will be given to manuscripts that are focused on developmental differences within the Asia Pacific region. Manuscripts will be peer reviewed and included in the journal on the following criteria:

- They contribute to the further understanding of developmental differences as well as the applications and implications in the educational, social and cultural environments.
- They include sound research methods, interpretation and validity of results
- They contain organised and clarity of writing
- They contribute to the local Asian context
- They should be original papers that have not been submitted to other journals or publications.

Editorial Policy—Retractions

The APJDD takes the issue of retractions very seriously. In line with requirements of major academic journals the APJDD will continue to monitor publications for retractions. No future citation will be permitted for articles that have been retracted and a correction will be issued if any such article is published in error. In the case of citations prior to retraction no such correction will be issued, in line with the policy for other journals of this type. Please contact the editor in the first instance if there are any concerns. COPE guidelines have been accessed in preparing this guidance.

Articles published in the APJDD should be original work that has not been published in this form elsewhere. In rare instances where previous publication has been made, this will be fully acknowledged.

Scientific Review Committee

In common with a number of other academic journals, we are now setting up a scientific committee of reviewers to assist the editor and editorial board in the review process.

- Dr Shaimaa Abdelsabour, Researcher and Teacher of English, Ministry of Education, Kuwait
- Dr Neil Alexander-Passe, Head of AEN/SENCO (SEN Researcher and Author), Additional Educational Needs, East Barnet School, London, United Kingdom
- Dr Yousuf ALmurtaji, Lecturer, Public Authority for Applied Education & Training, Kuwait
- Dr Amanda Denston, Researcher, University of Canterbury, New Zealand
- Pei Yi Fong, Specialist Psychologist, Dyslexia Association of Singapore
- **Dr Janet Hoskin**, Senior Lecturer Special Education, University of East London, United Kingdom
- Dr Kwok Fu Yu, Postdoctoral Researcher, Macquarie University, NSW Australia
- Edmen Leong, Director, Specialised Educational Services, Dyslexia Association of Singapore
- Shaian Lim Jia Min, Specialist Psychologist, Dyslexia Association of Singapore
- Dr Emma Moore, Edinburgh University, Department of Music, Scotland
- Sharyfah Nur Fitriya, Senior Educational Therapist & Educational Advisor, Dyslexia Association of Singapore
- Suvarna Rekha, Consultant Psychologist at IIIT-H and Moolchand Neurocenter, India
- **Dr Amir Sadeghi**, Assistant Professor for the Department of English Language Teaching, Islamic Azad University, Damavand Branch in Iran & Adjunct Researcher for the Language and Literacy Research Lab, University of Canterbury, New Zealand
- Ami Sambai, Assistant Professor, University of Tsukuba, Japan
- Shakthi Bavani D/O Sathiasilan, Senior Educational Therapist & Specialised Educational Services Preschool Core Team Member, Dyslexia Association of Singapore
- See Hui Zi Emilyn, Senior Educational Therapist, Dyslexia Association of Singapore
- Perle Seow, Specialist Psychologist, Dyslexia Association of Singapore
- **Dr Pawadee Srisang**, Lecturer, Science and Arts, Burapha University, Chantaburi Campus, Thailand
- Thomas Wilcockson, Lecturer, Loughborough University, United Kingdom

Submission of Manuscripts

All manuscripts are to be sent in electronic copy (MS WORD) as well as a PDF copy of the final edited document. PDF copy is required to verify the word copy and for publishing purposes. There is no need to submit hard copies of manuscripts.

Images, charts and diagrams should be sent separately where possible to ensure high quality reproductions.

Submissions are to be emailed to the editor at both email addresses below:

Angela Fawcett DAS Academic Director Dyslexia Association of Singapore, Emeritus Professor, Swansea University, angela@das.org.sg Deborah Hewes Managing Editor Dyslexia Association of Singapore www.das.org.sg/publications/journal deborah.hewes@das.org.sg

Preparation of Manuscripts

It is expected that all manuscripts be submitted using the American Psychological Association (APA) standard of referencing and publication. APA style is detailed in the Publication Manual of the American Psychological Association (6th ed), which offers sound guidance for writing with clarity, conciseness and simplicity. Authors should follow the APA style in preparation of their manuscripts.



DYSLEXIA ASSOCIATION OF SINGAPORE

HELPING DYSLEXIC PEOPLE ACHIEVE

Our Mission: Helping Dyslexic People Achieve

Our Goal: To build a world class organisation dedicated to helping dyslexic people and those with specific learning differences in Singapore.

Our Aims:

- To put quality first in delivering a comprehensive and effective professional service for dyslexic people and those with specific learning differences on a not-for profit basis.
- To provide an assessment service for individuals at risk of having dyslexia and/or specific learning differences.
- To provide educational programmes and other support services for individuals with dyslexia and/or specific learning differences.
- To raise public and professional awareness of the nature and incidence of dyslexia and specific learning differences.
- To enable others (teachers, parents and professionals) to help dyslexic individuals and those with specific learning differences.
- To assist and elicit financial and other support for people with dyslexia, those with specific learning differences and their families.
- To promote and carry out local research into dyslexia, specific learning differences and to disseminate results.
- To network with other organisations in Singapore and internationally to bring best practices to the DAS and Singapore.

DAS as a Social Enterprise

- We provide high-quality, professional, innovative and client-focused solutions to create and sustain services for the dyslexic community in Singapore and the region.
- We operate as a financially viable and cost-effective business which at the same time ensures that no dyslexic person is unable to access our services because they cannot afford it.
- We generate social returns on our investments through the development of a dynamic, motivated team of highly qualified and experienced professionals.
- We have a heightened sense of accountability to stakeholders through our professional management team.

Registered in 1991, the Dyslexia Association of Singapore (DAS) is today a vibrant voluntary welfare organisation with over 250 full-time staff who provide a wide array of services for dyslexics not only in Singapore but in the region. DAS Specialist Psychologists conduct assessment and diagnosis for preschool students to adults. DAS Educational Therapists, Speech and Language Therapists and Specialist Teachers provide support for over 3,500 preschool, primary and secondary school students in 14 venues all over Singapore. Increasingly, DAS provides support for dyslexics who also suffer from other Specific Learning Differences such as ADHD, Dyspraxia, Dyscalculia and Non-verbal Learning Differences.

The DAS Academy is a Private Education Institution (PEI) registered with the Council for Private Education (CPE). It is a wholly-owned subsidiary of the Dyslexia Association of Singapore (DAS).

Like DAS, the Academy is also a registered charity with the Commissioner of Charities. DAS Academy delivers a wide range of workshops and courses including a Master of Arts in Special Educational Needs. DAS Academy provides the bridge that links professionals, caregivers and people with special needs.

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