Asia Pacific Journal of Developmental Differences

Contents

Editorial Comment

Angela J. Fawcett, Editor-in-Chief

It is a very great pleasure to publish the 13th issue of the Asia Pacific Journal of Developmental Differences, now in its seventh year of publication, which is published by the Dyslexia Association of Singapore. The response to the previous issues continue to be extremely gratifying, and we intend to maintain these high standards in this issue and forthcoming issues. We have now amassed an even stronger editorial board, and I am grateful for the support of the academics and professionals involved in resolving any issues arising.

In this issue, we present seven articles representing international research on a number of important issues addressing theory and practice. In this issue, we cover the full range, from early education through to university, and highlight a range of approaches that have proved useful with children or adults with developmental differences.

In the first article from Lee Er Ker and colleagues, Speech–Language Therapists at the Dyslexia Association of Singapore, the authors set out to investigate the impact of their therapy on the progress of children with language difficulties on subtests of the CELF®–4UK, a key measure of language in common use in speech therapy. This was evaluated in a controlled study with the intervention group making significantly greater progress over the course of the intervention than the control group. This is an interesting study in an area which is rarely tackled in the literature because it is difficult to construct an appropriate study for children who can suffer from a range of differences in their language.

In the following two articles, a range of approaches are considered with children who suffer from visual deficits in their processing, that have been associated with dyslexia. In the first study presented by Isobelle Wong she undertakes an analysis of the level of visual deficits in a group of 30 children receiving support from the Dyslexia Association of Singapore. This study introduces a number of technical terms associated with visual deficit which are important for the following study as well. The results of this study identified a greater proportion of visual deficits in dyslexic children than in the general population, with some children showing evidence of quite severe deficits that would be predicted to impact on their progress in reading. Recommendations are made that future studies should routinely consider these aspects of processing.

A further study on visual deficits in dyslexia from Sharanjeet Kaur and colleagues in Malaysia considered the potential advantages of using ChromaGen II lenses to support children with difficulties. In a pre- and post-test study of performance before and after wearing the lenses, no effects were found on reading accuracy or rate, and no significant impact on binocular vision apart from stereopsis. Together, these articles provide a useful contribution to the literature, showing the need for appropriate support, and an evaluation of one approach to providing this support.

An article from George Cowie addressed the issues of inclusion for a child who suffered from high functioning autism at secondary level at an international school in Vietnam. In order to ensure that this boy felt more comfortable with his peers, a series of interventions were undertaken with staff and students in school. A presentation was made to both groups with an accompanying questionnaire, with support from the autistic boy's mother, as well as other pupils with autistic difficulties, in order to explain unusual aspects of behavior in autism. Following this intervention, staff expressed a need to be kept informed of the individual education plan for this boy and requested regular updates on the progress of autistic pupils in order to ensure the best possible outcomes. Although his peer group were less ready to come forward with comments, it was clear that they too, had developed greater awareness of autism and its consequences. This study identified that working with both children and families seemed to provide a useful way forward for ensuring smoother inclusion at school.

In the next article from Kristina Addis, she addresses the viewpoint of adults with dyslexia in the United Kingdom. In the article, the uptake of support provided by the disabled students allowance is considered. This is an important aspect of success for dyslexic students and others with disabilities and allows extra provision to ensure the greatest chance of reaching their potential. Using both questionnaires and quantitative measures the study established that the majority of these students did not take up all the support they were provided with. The article made it clear that there were many issues preventing full uptake, including difficulties in accessing the support provided and the timing of the assessments. This has important implications for other regions that have not yet established a support system for this age range.

The next article in this issue returns to the best type of support to ensure young children can learn effectively. Here Patricia Ng considers the importance and usefulness of echo poems that are designed to encourage children to verbalise and develop a sense of rhyme and rhythm. This has been shown to be a key aspect of early learning, that can easily be delivered using this charming traditional approach in a playful educational context.

Finally, an interesting case study on the importance of workplace culture in terms of mindfulness and resilience for Educational Therapists at DAS is presented by Harsheeni Rajoo, which builds on the use of creativity to build a positive working environment. This

approach is unique and holds considerable promise for further development. Overall, these seven articles provide a range of insights across a broad spectrum of ages and learning differences, including not only those with difficulties, but also the therapists that work to enhance their learning.

We hope that this issue will have something to offer every reader, whatever their background and area of interest. We look forward to welcoming many friends and colleagues back to Singapore in June 2020, from 24th to 26th to participate in another exciting UNITE SpLD Conference, with the abstracts of the articles reproduced in the next issue of Asia Pacific Journal of Developmental Differences (APJDD).

SPEECH AND LANGUAGE THERAPY PROGRAMME

DYSLEXIA ASSOCIATION OF SINGAPORE

Specialised Educational Services
UNLOCKING POTENTIAL

Specialised Educational Services (SES) is a division of Dyslexia Association of Singapore.

OUR SPEECH AND LANGUAGE THERAPY SERVICES

Speech-language therapy services provided at the DAS include both speech and language assessment and therapy.

OUR SPEECH AND LANGUAGE THERAPY

Speech-language therapy is meant for children (pre-schoolers to secondary school students) with speech, language and communication needs, who may or may not have a diagnosis of dyslexia. Therapy focuses primarily on oral language and on improving a child's listening, understanding, speaking, and/or social skills. Therapy is conducted following an intervention model in which therapy is determined by an individual's unique needs, whereby core deficits are addressed through a diagnostic/prescriptive approach based on clinical reasoning and remediation is provided at the level of hypothesized breakdown, independent of a curriculum, using speech and language intervention principles, protocols, methods, strategies and techniques that have demonstrated efficacy in addressing the hypothesized breakdown.

SIGNS OF SPEECH AND LANGUAGE DIFFICULTIES

Some indicators that your child might have speech and language difficulties:

- Delayed speech and language developmental milestones
- Mispronounces sounds in words (e.g. says 'toap' instead of 'soap')
- Shows confusion over words with similar sounds (e.g. mishears 'key' for 'tea')
- Shows difficulty in understanding and following spoken instructions
- Shows poor understanding of age-appropriate stories
- Shows difficulty remembering things that people say
- Shows difficulty in finding the right words to say
- Relates stories or events in a disorganised or incomplete manner

SPEECH AND LANGUAGE ASSESSMENT

A speech-language assessment is conducted to evaluate a child's speech, language and communication ability and determine whether it is age-appropriate. The assessment will further identify the child's strengths and weaknesses in these areas. If required, a comprehensive report will provide recommendations for intervention and learning support for the child's education. An assessment typically takes about 2 hours, or longer depending on the complexity of the case.

For more info, visit www.das.org.sg

Effectiveness of DAS Speech-Language Therapy: A controlled evaluation

Lee Er Ker[1*], Ho Shuet Lian[1], Sharon Reutens[1] & Elizabeth Lim Yien Yien[1]

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Abstract

Background: School-age children enrolled in the DAS speech-language therapy programme are often diagnosed with both dyslexia and language disorder. The current study shows the positive impact of language therapy on these children as it is practised by speech-language therapists (SLTs) at DAS.

Methods: The study involved 23 children in mainstream education aged 5 to 12 who were diagnosed with dyslexia and subsequently with mild-severe language disorder at the start of the study. A small-scale quasi-experimental design with a control group was used without random assignment of participants to either an intervention condition (n=11), or a control condition (n=12). The intervention group underwent language therapy directly delivered by DAS SLTs in a group setting (1 SLT : 2-3 children) once a week, an hour per session, for at least a term (i.e. ≥ 8 sessions). Participants in the control group matched those in the intervention group overall on age and level of severity but did not receive any speech-language therapy for the duration of the study. All participants in both groups received the same level of literacy support from educational therapists in the curriculum-based DAS Main Literacy Programme (MLP) whilst the study was on-going.

Results: Participants in the intervention group showed performance improvements compared to those in the control group in the primary outcome measures of different language skills as measured by the core language subtests of CELF®–4[UK], a standardised assessment tool used to assess the presence of a language disorder or delay in children aged 5-21. Statistically significant improvements were found in both the raw and scaled scores of the Formulated Sentences subtest. In addition, positive effect sizes ranging from small to large were observed for other subtests.

Conclusions: The current small scale controlled intervention study targeting the range of subskills addressed by CELF®–4[UK] identified the significant impact of the approach adopted by SLTs at DAS, with strong effect sizes. The findings support the use of small-group intervention as effective for children with a range of severity in language disorders.

Keywords: speech-language therapy, SLT, DAS, language disorder, group therapy,
                    language intervention

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INTRODUCTION

Language disorder is generally accepted as being neurobiological in origin (e.g. Krishnan, Watkins, & Bishop, 2016; Mayes, Reilly, & Morgan, 2015). Individuals diagnosed with a language disorder show language skills that are not commensurate with same-age peers, in the absence of cognitive deficits, neurological damage, sensory impairments, emotional disorders and/or environmental deprivation. Deficits associated with a language disorder include difficulties acquiring, understanding and using aspects of language pertaining to phonology, semantics, syntax, and morphology. Researchers and clinicians typically further categorise language disorders as either affecting the receptive or expressive modality, or both (e.g. mixed receptive and expressive language disorder). A receptive language disorder relates to a difficulty understanding what others say. An expressive language disorder involves a difficulty in communicating thoughts, ideas and feelings to others. Individuals with a language disorder exhibit great heterogeneity with respect to the deficits presented, modality affected, and severity. A diagnosis of language disorder in the preschool and school years has been variously termed as Primary Language Impairment (PLI), Specific Language Impairment (SLI), and recently, Developmental Language Disorder (DLD) (Bishop, 2017; Bishop, Snowling, Thompson & Greenhalgh, 2017; Bishop, 2014; Reilly et al., 2014).

The consequences of a language disorder that is developmental in nature are well documented. Individuals with a developmental language disorder struggle with academic achievement in the school years, lag their typically developing peers in coping with the increased language demands in school, and face considerable issues with literacy development (Dockrell & Lindsay, 2004; Snowling, Bishop, & Stothard, 2000) as well as difficulties with other academic skills such as mathematical skills (Beitchman et al., 1996). In addition, there is evidence that difficulties extend beyond the academic to the social domain in the school years, with affected individuals subjected to issues related to bullying and formation of peer relationships (Conti-Ramsden & Botting, 2004), with consequences that persist into adulthood (Law, Rush, Schoon, & Parsons, 2009; Tomblin, Freese & Records, 1992).

Dyslexia is a learning disorder that is also neurobiological in origin. Primary deficits associated with dyslexia include difficulties in accuracy and/or fluency in reading and spelling, in the absence of cognitive and sensory impairments (Lyon, Shaywitz, & Shaywitz, 2003). There is evidence that dyslexia and language disorder are closely related, although the exact nature of the relationship is still currently debated (Catts, Adlof, Hogan, & Weismer, 2005; Bishop and Snowling, 2004; McArthur, Hogben, Edwards, Heath, & Mengler, 2000). Individuals who are diagnosed with both dyslexia and a language disorder face daunting challenges in school exceeding that brought about by either diagnosis alone. Consequently, the provision of services to support these affected school-age individuals is paramount.

At the Dyslexia Association of Singapore (DAS), literacy support is provided by trained educational therapists through the Main Literacy Programme (MLP), a curriculum-based programme that primarily targets key essential learning components that are recommended for an effective literacy intervention, including language and vocabulary, phonemic awareness, phonics, morphology, reading fluency, comprehension, and writing, with emphasis on the written language and literacy and based on Orton-Gillingham principles. Therapy addressing language issues is provided by qualified speech-language therapists (SLTs) registered with the Allied Health Professions Council (AHPC) of Singapore. Language therapy is carried out following a skills-based intervention model in which therapy is determined by an individual's unique needs, whereby core deficits are addressed through a diagnostic / prescriptive approach based on clinical reasoning and remediation is provided at the level of hypothesised breakdown, independent of a curriculum, using language intervention principles, protocols, methods, strategies and techniques that have demonstrated efficacy to address the hypothesised breakdown. In contrast to the educational therapists at DAS, DAS SLTs focus almost exclusively on addressing issues in oral or spoken language in both the receptive and expressive modalities, and may include working on auditory attention, discrimination and memory. Phonological awareness difficulties may also be addressed since such difficulties are often experienced by individuals with a language disorder (e.g., Gillon, 2000). Language therapy is administered directly by DAS SLTs in group settings with groups not exceeding three children, at a frequency of one hour once a week.

LITERATURE REVIEW

In line with evidence-based practice, the language intervention practices typically adopted by the DAS SLTs in addressing the specific language deficits of children on their caseload are those that have been demonstrated to be beneficial. For example, DAS SLTs help children with word retrieval difficulties, a common issue associated with a language disorder, by helping them identify the semantic and phonological features of new vocabulary, a practice supported by the majority of published studies (Bragard, Schelstraete, Snyers, & James, 2012; Ebbels et al., 2012; German, 2002; Hyde Wright, Gorrie, Haynes & Shipman, 1993; Wing, 1990).

Similarly, DAS SLTs adopt various approaches that have been found to be useful in facilitating the development of syntax for children who struggle with syntax due to issues in understanding argument structure. This includes, but is not limited, to the use of Colourful Semantics (Bolderson, Dosanjh, Milligan, Pring & Chiat, 2011; Guendouzi, 2003; Spooner, 2002; Bryan, 1997) which is a meta-linguistic approach to help children develop awareness of acceptable word order and use accurate syntax in the creation of various sentence types through the use of colour coding of different thematic roles in sentences.

Furthermore, DAS SLTs align their clinical practice to incorporate procedures like imitation, modelling, or modelling plus evoked production strategies which have been shown to produce moderately large to large effects (Weismer & Murray-Branch, 1989) in helping children who have difficulties with syntax.

In contrast, there is a lack of research that evaluates whether group language therapy is as effective as individual therapy for school-age individuals diagnosed with both a language disorder and dyslexia. Much of the existing research on effectiveness of language therapy involved comparisons of individual versus group therapy for children with only a language delay or disorder. Intervention studies involving preschool children show no difference in outcomes for expressive vocabulary (Wilcox, 1991) for children aged between 1 and 4, and greater gains in expressive language but no difference in outcomes for receptive language (Barratt, 1992) when comparing intensive individual therapy to once-weekly sessions of group therapy over a 6-month period. For older children, group-based approaches have been suggested to be effective when teaching word-finding strategies to severely language impaired children (Hyde Wright, 1993), and sentence structure to children with primary delay using meta-linguistic training (Hirschman, 2000).

A more recent randomised controlled trial designed to compare outcomes resulting from various service delivery choices involving 161 school-age children (aged between 6 and 11 years) with persistent primary receptive and/or expressive language impairment found no significant post-intervention differences between individual and group modes of therapy on any of the primary outcome measures of standardised scores on tests of expressive and receptive language (Boyle, McCartney, Forbes, & O'Hare, 2007). While the results of these studies demonstrate the effectiveness of group therapy in language intervention, the scope of the studies is limited to children with a language disorder.

Research on the role of intensity of therapy in contributing to the efficacy of therapy targeted at helping school-age individuals diagnosed with both a language disorder and dyslexia is also lacking. Studies, mostly on preschool children, have found participants with primary language impairment making significant gains in treatment outcomes when treatment was intensive (e.g. three sessions per week) (e.g. Boyle et al., 1995). Nonetheless, no study exists that systematically compares the effects arising from differences in dosage to support the effectiveness of the current practice of administering an hour of language intervention per week for children diagnosed with a language disorder and dyslexia.

For these reasons, there is a pressing need to evaluate the efficacy of the DAS speech-language therapy programme that addresses language issues which is administered to school-age children to address language issues across the various linguistic domains (as opposed to a single domain like semantics) in a group setting at the intensity of an hour a week. The current small-scale study presents the first controlled evaluation that

lays the groundwork for further evaluative studies that provide a more balanced review of the effectiveness of speech-language therapy at DAS to inform clinical practice and service delivery in future, compared to the sole use of qualitative data (e.g. case studies) in the annual evaluation reports to evaluate effectiveness with respect to language intervention.

Specifically, this investigation would test the hypothesis that participants who had undergone speech-language therapy for language issues at DAS for at least a term show an improvement in their language skills when assessed using subtests from a standardised language assessment, compared to participants on a waiting list who have not received this support over the same period.

METHOD

Participants

All participants had been diagnosed with dyslexia prior and were simultaneously enrolled in the DAS Main Literacy Programme (MLP) as the primary intent of DAS SLT programme was to support these children in their language development. In addition, all participants had been identified from various referral sources after being assessed either by DAS psychologists, psychologists in private practice, paediatricians based in children's hospitals (e.g. KKWCH), and/or speech-language therapists based within or without DAS as needing more focussed speech-language therapy support and having potential language issues.

For participants in the intervention group, an additional criterion was involved, in that they had to be scheduled to commence language therapy at the beginning of the intervention period, or had only started language therapy immediately prior.

In contrast, participants in the control group were selected from the waitlist of children to be enrolled in the DAS Speech-Language Therapy programme. Due to staffing constraints, they were not foreseen to be scheduled for language therapy during the entire period of study. As much as possible, participants in the control group were selected to match the intervention group overall on age and level of severity.

Participants who met the criteria for each group were selected through opportunistic sampling from the various DAS Learning Centres which provided speech-language therapy intervention. A total of 23 participants were recruited, with a mean average age of 9;9 (SD = 1;6), comprising 17 males and 6 females.

A detailed breakdown of the number of participants in each group across the two age levels of 5-8 years old and 9-12 year old is shown in Table 1. It can be seen that the younger group of participants were well matched for age, whereas the older intervention

group were more than 1 year older than the controls. Typically, there are more children in the older age group presenting for support. The imbalance in the age groups arose because older children in the 9 – 12 year old group who were in need of speech-language therapy were seen as the priority for support.

Table 1: Breakdown of number of participants, average age and gender across the different age levels for both control and intervention groups

Gender	Control Group (n = 11)		Intervention Group (n = 12)	
	5 – 8yo Age Level (n = 4)	9 – 12yo Age Level (n = 7)	5 – 8yo Age Level (n = 3)	9 – 12yo Age Level (n = 9)
	Avg age (@t_0): 8;1	Avg age (@t_0): 9;7	Avg age (@t_0): 8;1	Avg age (@t_0): 11;2
Male(s):	3	6	1	7
Female(s):	1	1	2	2

Design

A small-scale quasi-experimental design with a control group without random assignment of participants to conditions (i.e., an intervention condition and a control condition) was used for the study.

Participants in the intervention group received speech-language therapy conducted by in-house DAS speech-language therapists, on top of literacy support provided by DAS educational therapists, throughout the duration of the study. The duration of speech-language therapy ranged between 8 to 20 weeks, at a frequency of 1 hour of therapy per week. The variance in duration of therapy was due to staffing constraints.

Participants in the control group received the same level of literacy support from educational therapists in the curriculum-based DAS Main Literacy Programme (MLP) as the intervention group. However, as mentioned earlier, they did not receive any speech-language therapy during the entire period of study due to staffing constraints.

The overall procedure involved in the study is illustrated below:

Group	Commencement of study (pre-test, t_0)	Intervention period	Conclusion of study (post-test, t_1)
Control	♦ All participants were assessed on CELF®–4ᵁᴷ	♦ All participants <u>did not</u> receive speech-language therapy in small groups ♦ All participants received literacy support from DAS educational therapists in the curriculum-based MLP	♦ All participants were assessed on CELF®–4ᵁᴷ
Intervention	♦ All participants were assessed on CELF®–4ᵁᴷ	♦ All participants received speech-language therapy in small groups ♦ All participants received literacy support from DAS educational therapists in the curriculum-based MLP	♦ All participants were assessed on CELF®–4ᵁᴷ

All participants from both the intervention and control groups were assessed at the commencement (t_0) and conclusion (t_1) of the study using the core language subtests of The Clinical Evaluation of Language Fundamentals®–Fourth Edition UK Edition (CELF®–4ᵁᴷ).

Assessment measures

The primary outcome measure was a standardised test of language ability. The Clinical Evaluation of Language Fundamentals - Fourth Edition UK (CELF®–4ᵁᴷ) assessment tool was selected to assess the language skills of participants. CELF®–4ᵁᴷ is an individually administered standardised language assessment that is widely used as a diagnostic tool to determine if a student (ages 5 through 21 years) has a language disorder, with

Age level		Core Subtests	Description
5 – 8 y o		**Word Structure**	Evaluates the ability to (a) apply word structure rules (morphology) to mark inflections, derivations, and comparison; and (b) select and use appropriate pronouns to refer to people, objects and possessive relationships. The participant completes an orally presented sentence that pertains to an illustration.
		Concepts and Following Directions	Evaluates the ability to (a) interpret spoken directions of increasing length and complexity, containing concepts that require logical operations; (b) remember the names, characteristics, and order of mention of objects; and (c) identify from among several choices the pictured objects that were mentioned. The participant identifies objects in response to oral directions.
9 – 1 2 y o		**Recalling Sentences**	Evaluates the ability to (a) listen to spoken sentences of increasing length and complexity, and (b) repeat the sentences without changing word meanings, inflections, derivations or comparisons (morphology), or sentence structure (syntax). The participant imitates sentences presented by the examiner.
		Formulated Sentences	Evaluates the ability to formulate complete, semantically and grammatically correct spoken sentences of increasing length and complexity (i.e. simple, compound, and complex sentences), using given words (e.g. car, if, because) and contextual constraints imposed by illustrations. The participant is asked to formulate a sentence, using target words or phrases, while using an illustration as a reference.
		Word Classes 2 – Total	Evaluates the ability to understand and explain logical relationships in the meanings of associated words. The participant selects two words among 3-4 words that go together and explains their relationship.

established reliability and validity in the areas of test content, response processes, internal structure, relationships with other variables, and consequences of testing (Semel, Wiig, & Secord, 2006).

For the purpose of this study, only the core language subtests of CELF®–4ᵁᴷ which comprise of the four most discriminating subtests for each age level were used. Performance in these core language subtests, when combined together, provides an overall measure of a student's language ability, with a high degree of reliability (average reliability coefficient: $r_{xx} \geq .90$) (Semel, Wiig, & Secord, 2006). The core language subtests for each age level, and a brief description of what was tested as indicated in the CELF®–4ᵁᴷ manual, are listed on the previous page.

At commencement (t_0), the presence of a language disorder was indicated in all participants in both the control and intervention groups, based on their pre-test scores on the CELF-4ᵁᴷ Core Language Subtests. The severity of the language disorder varied from mild (within -1 to -1.5 SD) to moderate (within -1.5 SD to -2 SD) to severe (-2 SD and below). An overwhelming majority of participants – 7/11 (63.6%) in the control group and 11/12 (91.7%) in the intervention group - were classified as having a severe language disorder. A detailed breakdown of the severity of the language disorder across the different age levels for both control and intervention groups at commencement of the study (t_0) is shown in Table 2.

Table 2: Breakdown of participants and the severity of their language disorder as indicated by CELF-4ᵁᴷ Core Language score across the different age levels for both control and intervention groups at commencement of the study (t_0)

Severity (at commencement of study, t_0)	Control Group (n = 11)		Intervention Group (n = 12)	
	5 – 8yo Age Level (n = 4)	9 – 12yo Age Level (n = 7)	5 – 8yo Age Level (n = 3)	9 – 12yo Age Level (n = 9)
Mild: (within -1 and -1.5 SD)	-	-	-	1
Moderate: (within -1.5 SD to -2 SD)	2	2	-	-
Severe: (-2 SD and below)	2	5	3	8

The number of language therapy sessions attended by participants in the intervention group varied considerably, with an average of 12.09 hours of speech-language therapy sessions (SD= -3.56; Range: 8-20). A detailed breakdown of the number of hours of speech-language therapy attended across the two age levels of 5-8 years old and 9-12 year old is shown in Table 3.

Table 3: Breakdown of the number of hours of speech-language therapy attended by participants in the intervention group across the different age levels

Intervention Group (n = 12)			
5 – 8yo Age Level (n = 3)		9 – 12yo Age Level (n = 9)	
Average number of SLT attended (hrs) = 11.00		Average number of sessions (hrs) = 12.56	
SD:	3	SD:	4.1
Range:	8 – 14	Range:	9 – 20

Intervention

Therapy followed a skills-based intervention model in which intervention was determined by a student's individual needs, whereby core language deficits were addressed through a diagnostic / prescriptive approach based on clinical reasoning and remediation was provided at the level of hypothesised breakdown, independent of any curriculum. Intervention sessions were conducted in small groups (2-3 children per group) and targeted the development of children's receptive and expressive language, in terms of syntax, morphology, semantics, as well as auditory attention, discrimination and memory. Phonological awareness activities were also included within the scope of therapy if required. Since participants in the intervention group presented with unique therapy needs due to differing severity levels and/or varied hypothesised underlying causes for their language deficit(s), the focus of therapy conducted for each participant in the intervention group was determined by the SLT responsible for the participant based on his or her clinical reasoning.

All four SLTs involved in the study were experienced speech-language therapists who were registered with full registration with the Allied Health Professions Council (AHPC) throughout the period of study. The AHPC is "a professional board under the Ministry of Health which governs and regulates the professional conduct and ethics of registered

allied health professionals, in accordance to the Allied Health Professions (AHP) Act 2011" (Allied Health Professions Council, n.d., para. 1).

Ethical permission was granted by the DAS Research Committee. Informed parental consent was obtained for each participant, and all participants were informed that they could withdraw from the study at any time.

RESULTS

The primary interest of the study was to investigate whether participants who have undergone language therapy at DAS for at least a term (i.e. ≥ 8 sessions) show an improvement in their overall language skills when assessed using subtests from the standardised language assessment compared to participants who have not done so during the same period. The results obtained by the intervention and control groups at commencement (t_0) and completion (t_1) are summarised in Table 4 below. The data for both age groups was collapsed for the majority of the subtests where possible, and analysis undertaken. A *t*-test was undertaken to check for differences between the intervention and control group. Effect sizes are also presented, based on Cohen (1988), because the small group sizes meant that the impact of the support was unlikely to reach significance. Effect sizes therefore can provide a more meaningful statistic to measure the improvements made by participants in this study.

Comparisons of the pre- and post-test results for intervention and control groups for the CELF®–4^{UK} subtest that is significantly improved are represented visually in the following figures:
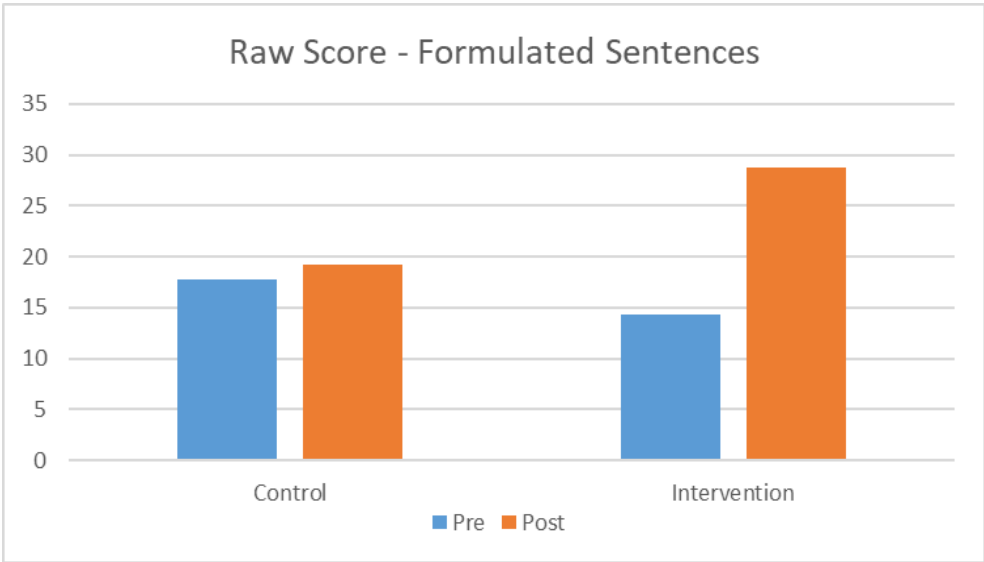
Figure 1. Raw Scores - Formulated Sentences (Pre- and Post-)

Table 4: Mean data raw scores for pre- (t_0) and post- (t_1) assessments with standard deviation in parentheses, with effect sizes and significance

CELF®-4UK Subtest	Control Group (pre-)	Control Group (post-)	Diff.	Intervention Group (pre-)	Intervention Group (post-)	Diff.	Effect size	Significance
Concepts and Following Directions [Raw]	33.09 (9.26)	35.82 (9.46)	2.73 (2.65)	36.75 (9.43)	44.08 (6.39)	7.33 (7.81)	1.74	p=0.08
Concepts and Following Directions [Scaled]	4.54 (3.5)	5.36 (3.47)	0.82 (1.20)	4.6 (1.78)	6.8 (3.61)	2.2 (3.91)	0.5	NS
Word structure* [Raw]	18.75 (2.22)	18.75 (1.89)	0.00 (1.41)	11.33 (2.52)	19.67 (3.21	8.33 (3.21)	2.00	N/A (4 and 3 per group)
Recalling Sentences [Raw]	29.27 (9.73)	30.64 (9.34)	1.36 (2.25)	28.08 (11.55)	34.67 (10.42)	6.58 (5.30)	1.38	P=0.07
Formulated Sentences [Raw]	17.73 (9.32)	19.18 (8.89)	1.45 (3.67)	14.33 (9.81)	28.83 (11.25)	14.50 (8.48)	2.15	p=0.0002** *
Formulated Sentences [Scaled]	2.18 (1.99)	2.00 (1.55)	-0.18 (1.47)	1.58 (1.73)	3.58 (3.18)	2.00 (1.21)	1.21	P=0.01**
Word Classes – Receptive [Raw]	5.86 (1.77)	7.00 (1.29)	1.14 (1.46)	7.00 (2.27)	8.50 (1.85)	1.50 (1.51)	0.24	NS
Word Classes – Expressive [Raw]	2.86 (1.46)	3.00 (1.41)	0.14 (0.69)	3.78 (1.64)	4.89 (1.45)	1.11 (1.40)	1.4	P=0.07
Word Classes 2 – Total* [Scaled]	4.3	5	-	4.6	5.1	-	NS	NS

* Data is available for both 5 – 8yo and 9 – 21yo Age Levels for all subtests except Word Structure (which applies only to the 5 – 8yo Age Level) and Word Classes 2 – Total (a combination of Word Classes 2 – Receptive and – Expressive Subtests, which applies only to the 9 – 12yo Age Level.
** / *** - statistically significant
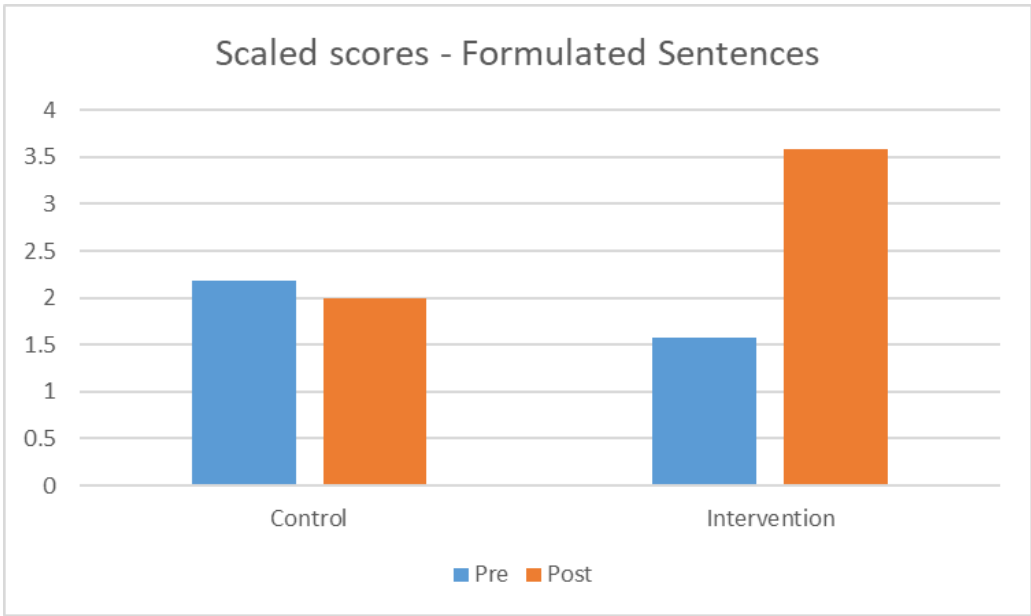
Figure 2. Scaled Scores – Formulated Sentences

DISCUSSION

This study investigated the effectiveness of the existing DAS speech-language therapy approach which adheres to a skills-based intervention framework in which language intervention is determined by a student's individual needs. Core deficits in a student's receptive and expressive language, in terms of syntax, morphology, semantics, auditory discrimination and memory, or phonological awareness are addressed through a diagnostic / prescriptive approach based on clinical reasoning and remediation is provided at the level of hypothesised breakdown, independent of any curriculum. Consequently, within the boundaries of sound clinical reasoning and evidence-based practice (EBP), DAS speech-language therapists have the flexibility to determine and implement specific therapy techniques, strategies or protocols deemed most appropriate in addressing a student's individual needs at the point of intervention when planning and implementing therapy, rather than applying a structured, pre-determined intervention protocol for each area of language difficulty. Such evidence-based practice is premised on the American Speech and Hearing Association's (ASHA) guidelines on EBP (ASHA, n.d.) and involves the integration of not just external scientific evidence and client/patient/caregiver perspectives, but also clinical expertise and expert opinion. Another feature of current DAS speech-language practice is that therapy is typically delivered in small groups (2-3 children per group) at a frequency of an hour per week.

All scores for the intervention group were enhanced in comparison with the control group. Participants in the intervention group made statistically significant improvements in results in one subtest of the standardised assessment (the Formulated Sentences subtest), which showed significant improvement in scaled scores (raw scores: p = 0.0002; scaled scores: p = 0.01). Scaled scores are the most difficult measure to improve, because they are adjusted for age. There was a trend towards significance on the following tests: Concepts and Following Directions; Recalling Sentences and Word Classes 2-Receptive.

Groups were well matched at pre-test, with no significant differences. Effect sizes were calculated, which allows for a comparison between different subtests that are scored on different criteria, and shows impact where statistical significance is not reached. The most conservative method was adopted where intervention and control standard deviation varied, using the average standard deviation of the 2 groups. A positive effect size (Cohen, 1988) was identified, with d=0.2 representing a 'small' effect size, 0.5 representing a 'moderate' effect size and 0.8 representing a 'large' effect size. It may be seen that the effect sizes for Concepts and Following Directions, Formulated Sentences, Word Structure, Recalling Sentences and Word Classes 2-Expressive were particularly strong.

Many studies on the efficacy of intervention that target several language areas, or a specific area, have reported significant gains using outcome measures other than standardised tests (e.g. Ebbels, Maric, Murphy, & Turner, 2014; Ebbels et al., 2012; Parsons, Law, & Gascoigne, 2005; Hayward & Schneider, 2000; Throneburg, Calvert, Sturm, Paramboukas, & Paul, 2000). In contrast, the majority of those that do use standardised tests as outcome measures fail to show significant effects of intervention (Boyle, McCartney, Forbes, & O'Hare, 2009; Gillam et al., 2008). Hence, it is encouraging to note that participants of this study in the intervention group made statistically significant improvements in results of one subtest of the standardised assessment, and that effect sizes were particularly strong in others.

Direct comparisons of current results with studies using other approaches, for example, a more structured approach designed to target oral language difficulties in small group settings, are difficult to make. A structured approach is generally rooted in manualised intervention, in which lessons are built around units based on specific linguistic targets and follow a pre-determined, structured sequence that builds upon learning established by earlier units, with accompanying principles, protocols and/or techniques in its delivery to facilitate acquisition of programme targets. Obstacles to direct comparisons include variances in the scope of language domains targeted, the age-group of participants, the service delivery model, duration and the intensity of intervention. Moreover, programmes based on a structured approach are typically delivered by educational staff or paraprofessionals (e.g., SLT assistants) who have undergone thorough training by the programme developer(s) and/or their certified trainers to ensure fidelity and SLTs play

only minor roles in initial programme-related training in such programmes (if at all), rather than being the main agents of intervention in direct contact with the child. These notwithstanding, the results of the current study compare favourably with a study of a structured programme delivered by trained paraprofessionals and developed to facilitate the acquisition of age-specific syntax and vocabulary in both the receptive and expressive modalities (Phillips, 2014). In the study, significant findings on proximal measures of intervention-linked syntax and listening comprehension in all grades were reported, as well as positive trends in near-transfer standardised syntax measures (e.g., Sentence Structure from the CELF®–4ᵁᴷ) or listening comprehension measures in two of the three grades. The participants were young children from prekindergarten to first grade (age range 40 – 101 months). However, the participants were identified for the study by virtue of having scored below the 30th percentile on several standardised language measures, indicating below-average language abilities. This criterion for participant selection is less stringent than the criterion of at least -1 SD away from the mean, or just below the 14th percentile, usually indicated for a diagnosis of a language disorder.

In terms of therapy techniques, strategies or protocols used by DAS SLTs, it is only possible to highlight studies that have targeted individual domains or aspects of language. With respect to syntax and morphology, for example, the use of modelling with imitation has been found to be effective for teaching novel derivational morphemes to younger children with SLI (Connell & Stone, 1992). In the study, children aged between 5 and 7 years old who were presented with a target morpheme being used in a meaningful way and then asked to repeat what they had heard showed significantly more use of the target morphemes. Similarly, recasting has been found to increase production of a range of morphosyntactic structures including the passive construction and gerund formation in children with SLI (Camarata & Nelson, 1992; Camarata, Nelson & Camarata, 1994; Nelson, Camarata, Welsh, Butkorvsky, & Camarata, 1996), though for recasts to be maximally effective, the density of recasts needs to be sufficiently increased (Proctor-Williams & Fey, 2007; Fey & Loeb, 2002; Proctor-Williams, Fey, & Loeb, 2001) and when children are already using the target form to a certain extent (Saxton, 2000). In the domain of semantics and vocabulary, semantic strategies like classifying words into predefined categories, defining words, elaborating on the functions of objects, and phonological strategies such as identifying the initial sounds of words, and counting the number of sounds and syllables in words, have been shown to have a positive effect in improving the word-retrieval abilities of children (Wing, 1990). These strategies are frequently used by DAS SLTs to address language issues pertaining to syntax and morphology, as well as semantics and vocabulary.

Furthermore, the results of the current investigation lend some support to the efficacy of the current service delivery model of providing speech-language therapy in small groups (2-3 children per group), rather than individually, at least for therapy that target language issues (as opposed to articulation or fluency issues, for example). The results

are consistent with several other studies investigating the effects of group therapy for children with a language disorder. For younger children, a controlled study on the efficacy of individual versus group therapy on children with primary delay between 0-7 years old found group therapy targeting communication skills effective in situations where there was direct contact between the SLT and children (Best, Melvin & Williams, 1993), albeit at an intensity of two such sessions per week, more than that provided in the current study. For older children, group-based approaches have been reported to be effective for teaching word-finding to 4 children with an average age of 8 years (Hyde Wright, 1993), and sentence structure (Hirschman, 2000) to children with primary delay between 9-11 years old. In a randomised control trial involving 161 children with primary language impairment aged between 6 -11 years old that compared language outcomes following individual versus group modes of speech and language therapy, researchers concluded that there was no significant post-intervention differences between individual and group modes of therapy conducted by SLTs (Boyle et al., 2007).

Similarly, the results can be cautiously interpreted to suggest that the therapeutic approach adopted by DAS SLTs is suitable in addressing the language issues faced by children with a language disorder of varying severity ranging from mild to severe while simultaneously diagnosed with dyslexia. Research on the efficacy of intervention on this group of children is difficult to come by. The majority of studies focus on therapy contributing to a positive effect on vocabulary and expressive language skills (e.g. Law, Garrett & Nye, 2003; Ebbels, 2014), with the benefits less clear for children with receptive language difficulties, and/or more severe language issues like those faced by the participants of the current study. It must be noted that the participants in such studies are not diagnosed with both dyslexia and language disorder.

Finally, it is only recently that intensity of therapy and its effects on therapy outcomes have received more attention in research. More intensive therapy seemed to suggest better outcomes in earlier research (e.g. Barratt, Littlejohns & Thompson, 1992). The consensus today is that the relationship between the two is more nuanced than generally assumed. The findings of one study exploring the relationship between language outcomes and intensity of intervention suggest that more intensive language treatment, when considered purely as a measurement of total overall therapy duration, is not necessarily associated with better treatment outcomes (Schmitt, Justice, & Logan, 2017). For this study, direct child measures, weekly treatment logs and videotapes related to 233 children with language impairment in the US public school system were collected and used to examine children's language outcomes and treatment experiences. Baker (2012) similarly expressed the view that the interplay of frequency, session duration, and total intervention duration is far more complex to conclude with certainty that more intense intervention equates to better therapy outcomes when commenting about the optimal intensity of intervention in speech-language pathology in general (i.e. beyond language disorders and including speech sound disorders in children, emergent literacy, reading, aphasia, dysphagia, stuttering, motor speech disorders, voice disorders, and

traumatic brain injury). The results of this study seem to suggest that children diagnosed with both a language disorder and dyslexia undergoing language therapy at DAS at an intensity of an hour per week do benefit from the intervention, but the question of whether the participants, or which group of participants, would have benefitted more (or less) from differences in intensity of therapy remains unanswered.

LIMITATIONS AND DIRECTIONS FOR FURTHER RESEARCH

It should be noted that, although controlled, this evaluation represents a small-scale study, but this in itself is important because it reflects a naturalistic approach to language intervention. The impact of SLT has typically been seen as difficult to evaluate, because the approach is individually tailored to the needs of each child or group of children Adding to the complexity is the fact that the population size of children simultaneously diagnosed with language disorder and dyslexia is not large to begin with and, even within this niche group, there are considerable variances in severity of the language disorder, areas of weakness and strengths in receptive and expressive language, and the cognitive, sensory and communication profiles of each child. Furthermore, there is wide variability in terms of co-morbidities with other medical conditions, age of entry when intervention was first accessed, previous and current experiences with therapy and/or other literacy interventions, and the level of parental and educator knowledge and commitment available to support the child at home and in the different schools which contributes significantly to the intricacies of intervention and limits the research designs that may be used in measuring its effectiveness. Consequently, it is posited that accounting for the variances mentioned and separating the effects arising from the interactions with and interplay of each of these factors is overwhelmingly complex and of limited practical value. Consequently, in contrast with the previous research cited here, the current study attempted to evaluate an approach to language intervention, rather than adopting a standard intervention applied across the board regardless of need. It could therefore be seen to be more useful clinically in identifying the impact of language therapy, and not simply an evaluation for research purposes.

Nevertheless, the design of the study is subject to a number of limitations, most specifically in the small number of participants, which reflect standard procedures in SLT support, and an imbalance in the age groups, with the children in the intervention group older than the controls. Interestingly, this is likely to reflect more severe difficulties in this group, who despite the advantage of age continue to struggle with language (e.g. Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). It might be predicted that their difficulties would be harder to remediate, so this is a good challenge for the approach. It is particularly rewarding to be able to report the impact of the intervention with this group.

A further key issue emerging is the usefulness of undertaking language therapy within a small-group framework. The most pertinent research here examining this approach is

the report by Boyle et al., 2007, which also confirmed the usefulness of the small group approach in comparison with individual therapy. SLT is a lengthy and expensive process, although crucial to the development of effective language skills. If further large scale research confirms that working in small groups can be just as beneficial as individual therapy, this could transform opportunities for children with language disorder/ dyslexia, who are typically doubly disadvantaged by their complex needs. This would ease the pressure on highly skilled therapists and the use of small groups in themselves could facilitate further progress within the group. It would also be useful to consider the optimum number of sessions, but this may well vary depending on the severity of the difficulties, and the difficulty in ensuring that progress will continue long term, after the therapy has ended.

CONCLUSIONS

The small scale controlled intervention study targeting the range of subskills addressed by CELF-4[UK] identified significant impact of the approach adopted by SLTs at DAS, with strong effect sizes. The findings support the use of small-group intervention as effective for children with a range of severity in language disorders.

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An Exploratory Study to Investigate Eye Movement Performance and Visual Perceptual Skills in Children with Dyslexia

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ABSTRACT

During recent years, many studies have shown that reading difficulties such as dyslexia can co-exist with visual processing deficits. As estimated, 80% of the time, a child learns through the visual channel; any deficits in visual processing may affect learning. While intervention related to phonological deficits is well accepted and practised in Singapore, the possible impact of visual deficits is rarely considered, especially with regard to eye movements and visual perception. Hence, these deficits are usually discovered much later or remain undiagnosed. This study investigates the eye movement performance and visual perception skills in a group of 30 children with dyslexia from the Dyslexia Association of Singapore (DAS) learning centres. The tests used for assessment were the Developmental Eye Movement (DEM) test and the Test of Visual Perceptual Skills (non-motor) 4th Edition (TVPS-4). The data collected were analysed against the normative data. Among the participants, 56.67% of them showed eye movement deficits and 46.67% of them displayed visual perceptual weaknesses. Sixty percent of the parents were aware that their child tends to leave out or confuse words when reading. However, only eleven of the participants had an eye examination by an ophthalmologist or optometrist.

Based on the key findings in this study, it is essential to raise awareness among professionals and parents regarding the importance of eye movements and visual perception in children with dyslexia. Any child who shows signs of visual difficulties should be referred for more in-depth visual assessment to identify the actual cause of the difficulties.

Keywords: dyslexia, reading difficulties, eye movement, visual perception, visual perceptual skills, visual processing deficits, rapid automatized naming (RAN)

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INTRODUCTION

Dyslexia is a specific learning difficulty that occurs in reading and spelling, which may be due to an abnormal developmental process (developmental dyslexia) or neuropathological diseases (acquired dyslexia). Developmental dyslexia (DD) is the focus of this study. Dyslexia is a lifelong condition, usually persisting throughout life. It has long been known that dyslexia is linked to impairments in processing the phonological features of written or spoken language (Snowling, 2000). Those with dyslexia tend to encode phonemes differently while all the other language subsystems remain relatively intact (Ramus et al., 2003). Recently, studies have demonstrated that the pathophysiology of dyslexia is more complicated than formerly thought, beyond the classically defined phonological deficits. Through the use of functional neuroimaging, a more precise definition of the pathophysiology of dyslexia is achieved.

The role of vision in reading difficulties has received interest for these past few decades. Numerous studies have shown that visual deficits are present in dyslexia (Eden et al., 1996). There have been ongoing debates regarding the existence of a link between visual anomalies and reading difficulties.

During recent years, studies have shown that reading difficulties such as dyslexia can co-exist with visual processing deficits (Everatt, 2002). Peer (2001) noted that dyslexia may accompany weaknesses involving visual perception. Griffin et al. (1997) posit that reading difficulties can be a result of vision problems. They proposed that people with reading difficulties can be divided into three main groups according to the causes and manifested signs and symptoms:

i)   specific vision problems causing general reading dysfunction;
ii)   coding problems of dyslexia causing specific reading dysfunction and
iii)   other problems that cause general reading dysfunction, such as attention-deficit disorder and auditory deficits.

As some of the conditions can co-exist, additional subsets of deficits may be formed. By subdividing into these categories, it is apparent that if vision problems can cause reading dysfunctions, proper management of these visual issues can improve the visual functions and ease the related signs and symptoms, hence optimising the children's reading potential.

Everatt (2002) argued that many studies have shown that reading difficulties such as dyslexia can co-exist with visual processing deficits. To date, dyslexia stands out as one that directly impacts the learning ability of an individual (Stein, 2014). It has led to an increased focus on dyslexia, and restructuring of learning in a way to help the learner to improve their capabilities. Eden et al. (1996) suggested that the deficits may be associated with the magnocellular subsystem which is related to visual processing.

According to Arthur Marten Skeffington, the 'father' of developmental optometry, the fundamental functional components of vision consist of visual acuity, binocular vision, eye movements and visual perception, and they are interdependent (Schuhmacher, 2017). Hence, a comprehensive visual assessment for children with learning issues should include these four components.

While the phonological deficit is relatively accepted, the impact of visual deficits remained debatable. Peer and Reid (2003) have suggested that there is growing evidence that visual factors are associated with dyslexia. In 2014, Stein mentioned that visual complaints are common in children with dyslexia, which may be caused by the abnormal development of visual nerve cells. The vision-related symptoms include distortion, blurring, merging or moving of letters or words (Stein and Walsh, 1997). Moreover, misread words, missing words and skipping lines when reading, are also frequently presented, suggesting a consequence of poor visual processing.

These symptoms may lead to eye strain and headaches (Wilkins, 1995). However, it is unclear from the work of Wilkins, whether those with dyslexia are more subjected to visual stress, than those without dyslexia.

RELEVANCE OF TESTING FOR CHILDREN IN SINGAPORE

In Singapore, the diagnosis of dyslexia is usually carried out by an educational psychologist. The Dyslexia Association of Singapore (DAS) works closely with the Singapore government, to provide educational therapy under the MOE-aided DAS Literacy Programme at the learning centres, which cater to the needs of the majority of students from local mainstream schools (Dyslexia Association of Singapore, 2018).

The Health Promotion Board (HPB, 2018) in Singapore has been conducting vision screenings at schools to detect potential vision problems. However, the routine eye examinations conducted locally focus on ocular health, visual acuity and refractive errors (due to high myopia incidence). Although it is not necessary for a child to have a detailed optometric psychometric assessment to be diagnosed as having dyslexia, it is recommended that all children suspected by teachers or parents of struggling with academic work should be examined by an ophthalmologist or optometrist, preferably one who has undergone specific training in assessing children with learning difficulties.

The diagnosis and intervention for dyslexia by psychologists or educators focuses mainly on auditory examination only, which may be insufficient and inconclusive. Often, visual information processing deficits remained undetected, and these deficits inevitably affect school achievement (Vaughn, Maples and Hoenes, 2006).

AIMS

Despite all the visual and magnocellular theories, we are still not sure what is the percentage of children who had been previously diagnosed with dyslexia using the conventionally available assessments, who may have possible underlying visual deficits in either the international or local context. Hence, this forms an initial study to investigate the eye movement performance and visual perceptual skills in children who have been previously diagnosed with dyslexia and are receiving phonics-based literacy intervention at the DAS learning centres. This group of children are bilingual, studying in local mainstream schools. They have average or similar general cognitive skills as compared to their peers, studying in this highly competitive and demanding educational environment. It is vital for us to investigate and provide the appropriate accommodations and interventions accordingly.

DYSLEXIA

Dyslexia is primarily divided into two causes, language processing and visual processing (Campbell, 2009), it is separated from reading difficulties caused by vision or hearing problems, or by insufficient teaching (Peterson and Pennington, 2012). According to Stein (2014), vision problems may be caused by atypical development of the visual nerve cells. Dyslexia can be classified into three types: phonological dyslexia, surface dyslexia and deep dyslexia, although these last two are less frequently used in recent terminology.

Many theories attempt to explain the possible causes of dyslexia. According to Mody and Sillman (2008), the five main theories of dyslexia are the cerebellar theory, the phonological processing theory, the rapid auditory processing theory, the visual theory, and the magnocellular theory. The visual theory suggests that dyslexia is a visual processing deficit, based on impairment in processing letters and words from a written text. Visual processing problems include poor vergence, unstable binocular fixations and visual crowding. It does not reject the presence of other possible causes of dyslexia (Ramus et al., 2003). According to Hinkley, Schoone and Ondersma, (2011), learning-related vision problems are divided into visual efficiency and visual information processing.

The magnocellular theory aims to combine the above four theories. It advocates that as well as deficits in the visual pathways, the magnocellular dysfunction includes deficits in the auditory and the tactile systems (Ray, Fowler and Stein, 2005; Ramus et al., 2003). Laycock, Crewther and Crewther (2012) shared similar sentiments in their research, which shows evidence for a sizeable magnocellular impairment in some individuals with dyslexia.

It has been suggested that deficits in the transient system of the magnocellular pathway are the cause of dyslexia (Omtzigt, Hendriks and Kolk, 2002; Stein, 2001; Demb, Boynton

and Heeger, 1998; Greatrex and Drasdo, 1995). The transient system controls 'where' the eyes should move. Hence, any deficiency in this system may result in poor eye movements during reading. Although the evidence for this theory is diverse (Schulte-Körne and Bruder, 2010; Skottun, 2000), Gori et al. (2016) had recently established a causal relationship between dyslexia and the dorsal pathway deficit.

Besides the above-mentioned theories, the other theories are the naming speed deficit and the double-deficit theories. The naming speed deficit theory demonstrates the speed a person can employ in the rapid automatized naming (RAN) of familiar letters or objects. It is a robust predictor of dyslexia (Denckla and Rudel, 1976). This theory hypothesised that naming speed deficit is detached from the phonological processing deficit. Hence, there are four possible groups of combinations:

    i)   individuals with no deficit,
    ii)   individuals with phonological processing deficit,
    iii)   individuals with naming speed deficit, and
    iv)   individuals with double-deficit (both naming speed deficit and phonological processing deficit).

Individuals with double-deficit tend to face more difficulties in reading. Hence, it is essential to distinguish the deficits among children with dyslexia in order to provide the right instructional intervention. If we only provide phonological intervention to children with double-deficit, they will only receive part of what is required (Birsh, 2005).

DYSLEXIA AND THE VISUAL SYSTEM

As it is estimated that 80% of the time, a child learns through the visual channel (Kaplan, 2015), visual difficulties may be a primary or contributory factor in learning disorders (Kemp, Smith and Segal, 2018). Although the impact of visual deficits remained debatable, there is growing evidence that visual factors are associated with dyslexia (Peer and Reid, 2003). The findings and concepts behind surface dyslexia and the visual theory of dyslexia have strongly supported the presence of visual deficits in those with dyslexia.

According to Stein (2014), visual complaints are common in children with dyslexia, which may be caused by the abnormal development of visual nerve cells. The vision-related symptoms include distortion, blurring, merging or moving of letters or words (Stein and Walsh, 1997). Often, this results in a misreading of words, an omission of words and skipping of lines when reading, suggesting the consequence of poor visual processing. Additionally, these symptoms may lead to eye strain and headaches (Wilkins, 1995), as noted above.

Furthermore, Georgiou et al. (2012) found that her sample of children with dyslexia did not have auditory challenges, but around half of them displayed visual processing deficits. Although orthographic and rapid automatized naming (RAN) processing deficits were present in these children, the relationships among them remained unclear. Hence, it is essential to investigate the RAN in children with dyslexia.

Learning-related vision problems are divided into visual efficiency and visual information processing (Hinkley, Schoone and Ondersma, 2011). Visual efficiency includes visual function relating to refractive errors, accommodation, vergence and eye movements, while visual information processing comprises higher brain functions integrated with the motor, auditory, language and attention systems (Borsting et al., 1996). The process includes non-motor aspects of visual perception and cognition. It provides the meaning to what is seen, through organising, structuring, and interpreting visual stimuli.

Regrettably, deficits related to visual information processing are often missed out, only discovered much later when learning issues have surfaced or may remain undiagnosed. Especially in Singapore, these testing of visual information processing skills are rarely practised and almost unheard of. Hence, this study hopes to address this gap, investigating eye movement performance and visual perceptual skills in children with dyslexia.

EYE MOVEMENTS

According to recent studies, reading comes in two main processes, the 'decoding' then the 'comprehension' stage (Muter, 2003; Evans, 2001; Griffin et al., 1997; Rack et al., 1994; Simons and Grisham, 1987). Immature readers rely on decoding through phonetic analysis while mature readers employ both sight analysis and phonetic analysis. Hence, decoding is an essential skill for early readers as we learn to read by recognising the shape of familiar words and by building up our sight-word vocabulary through visual images (Evans, 2001).

As reading deficits start with a problem of decoding of an 'object or text' when reading, eye movements, especially saccadic eye movements, play a significant role in reading (Eden et al., 1994; Poynter et al., 1982). With eye movements forming part of the visual system, it is logical that imperfect eye movements may deter the performance of reading. As a consequence, it hinders comprehension, which develops in the higher orders of the brain and gradually become more vital in learning (Schuhmacher, 2017; Evan, 2001).

There are many subtypes of eye movements. The two core types are the vergence eye movements and the version eye movements. Saccadic eye movements or saccades (2-3 degrees) are rapid shifts in fixation from one point to another, which are important during reading, when the eyes need to move smoothly along a line of print, then back and down to the start of the next line for extended periods. However, assessment of

saccadic eye movements is not included as part of the routine eye examination in Singapore. Although eye movement deficits may not be the only contributory factor to reading difficulties, better control of saccadic eye movements can translate to more precise and quicker reading speed (Fischer and Hartnegg, 2000) and reduce the percentage of reading errors (Fischer and Hartnegg, 2008). Therefore, it is of great benefit to investigate the saccadic eye movement performance in children with dyslexia in Singapore, to determine the potential underlying causes which were undiagnosed.

Rapid automatized naming (RAN) involves the involuntary ability to recognise visually presented objects, numbers or letters, and express the verbal label swiftly and precisely (Denckla and Rudel, 1974). It is partly reliant on the automatic visual processing of the stimulus. These processes are essential in identifying and recognising of single words, improving reliability in predicting word identification ability as well as word-level reading difficulties (Meyer et al., 1998a; Meyer et al., 1998b; Fawcett and Nicolson, 1994; Denckla and Rudel, 1976). Hence, RAN emerges as a stronger predictor of reading performance than phonological processing ability, in some studies, and signifies as the second component of the double-deficit hypothesis of reading disability (Wolf et al., 2002; Wolf and Bowers, 1999; Wolf and Obregón, 1992).

Also, slow naming speed could suggest poor automaticity in producing orthographic or visual mental illustrations of letters or words, which is required in rapid word recognition (Becker, Elliott and Lachmann, 2005; Wolf and Bowers, 1999). Since RAN involves visual input, visual dysfunction may be one of the causative factors. Therefore, deficits in RAN have been associated as a risk for reading difficulties which can co-exist with the phonological deficits (Wolf, Bowers and Biddle, 2000).

EYE MOVEMENTS AND READING

During reading, the eyes need to be able to track and search words. Accurate and well-coordinated eye movements such as saccades and visual tracking are highly essential. Visual tracking involves the accurate and synchronised movement of the eyes from one word to another. When saccades are poor, the ability to scan along a horizontal line of text (tracking) may be affected.

The frequency and duration of fixations depend mainly on the level of difficulty of the reading material, word ambiguity and grammatical function. According to Aslin and Salapatek (1975), younger children tend to have large saccadic corrections and higher drift rates during fixation. In addition to immature control, these errors may be due to attention factors (Aslin and Ciuffreda, 1983).

When reading English, a mature reader's saccades can travel six to eight-characters of text within the foveal region, with each fixation lasting approximately 225 milliseconds (Ciuffreda and Tannen, 1995). Occasionally, we need to move our eyes backwards to

re-read the same text. The backward shift is called regression and only extends to a few characters. A large right-to-left saccadic eye movement is required during reading, from the end of one line to the beginning of the following line. This type of saccade is known as a return-sweep saccade; it covers approximately 12 to 20 degrees and has a duration of 40 to 54 milliseconds (Ciuffreda and Tannen, 1995). When the eye movement is affected, increased regression may cause loss of place, lead to misrepresentation of information to the brain. Any word additions, omissions, transpositions or substitutions, and/or skipping lines, may trigger text confusion or affect comprehension. In short, good readers tend to have longer saccades, shorter fixation time and fewer regressions than poor readers (Rayner, 2009; Rayner, 1998; Rayner, 1985). When the development of this skill fails, reading and writing abilities are often below expectation (Chivers, 2006).

Various studies had investigated the quality of saccades in individuals with reading difficulties (Solan et al., 1998; Eden et al., 1994; Ygge et al., 1993a; Ygge et al., 1993b; McConkie et al., 1988; Ciuffreda, Kenyon, and Stark, 1985; Pavlidis, 1985; Ciuffreda, Kenyon and Stark, 1983). They found that individuals with reading difficulties tend to have a deprived quality of eye movements, consisting of increased numbers of saccades and longer fixation time. Also, an excessive number of regressions are recorded as these individuals tend to reread, to double-check the correctness of decoded words. The prolonged duration of fixations and higher numbers of fixations indicate impairment of lexical and sublexical pathways (Hatzidaki et al., 2011; Hawelka, Gagl and Wimmer, 2010).

Pavlidis (1981) established that individuals with dyslexia exhibit more right-to-left saccades than normal and have backward shifts when observing a non-text target (a moving dot on a computer screen). Subsequent studies were unable to replicate the results in Pavlidis' study (Black et al., 1984; Brown et al., 1983; Stanley, Smith and Howell,1983), and his findings remain controversial. These may be due to the differences in variable criteria in the subject selection, instructions given to subjects, experimental procedures and stimulus characteristics, which further research would need to resolve.

However, later studies have found poor saccadic control in those with dyslexia (Biscaldi, Gezeck and Stuhr, 1998; Biscaldi, Fischer and Aiple, 1994; Fischer and Weber, 1993; Fischer and Weber, 1990). Any poor eye control may cause gaze problems when reading and copying, as they may miss words out or lose their place.

Hence, this leads to excessive head movements when changing gaze and poor control of reflexive eye movements. Also, Eden et al. (1994) reported that poor fixation stability was observed in children with dyslexia during non-verbal visual tasks. These controversial findings further propose the need to investigate the presence of eye movement deficits in children with dyslexia.

The relationship between saccadic dysfunction and reading difficulties has been well-documented, although it may not be the only cause of reading difficulties, they may further contribute to the learning difficulty (Kulp and Schmidt, 1996; Poynter et al., 1982; Hoffman, 1980; Lefton, Lahey and Stagg, 1978; Sherman, 1973). Nevertheless, whether eye movement deficits are the primary or secondary cause of dyslexia, it is crucial, to identify the presence of the deficits rather than focusing on the cause and effect relationship between eye movements and dyslexia.

VISUAL PERCEPTION

During reading, the visual demands are high. Other than eye movements, visual information processing skills consist of visual perception. Visual perception involves the non-motor visual analysis ability to see, understand and interpret the images seen by the eyes, then act. These processes are served at a high level of executive function in our brain (Schuhmacher, 2017).

According to Groffman (2006), visual perception is an active process of locating/ identifying and extracting information from the environment. It brings together visual clues from the surroundings, and interactions between other senses involving higher cortical function. The route can be complicated, linking previous experience, organisation, and elaboration of the nervous system (Solan and Ciner 1989). When addressed separately, visual perception integrates all components simultaneously to enable appropriate interaction and to perform in all daily functions for instant communication, social interaction, mobility and learning. Visual perceptual processing is vital in the progression of visual skills needed for all visual learning, including reading and assimilating information (Goodrich et al., 2007).

There are seven areas of visual perceptual skills classified by Scheiman and Rouse (2006) and Gardner (1996). These include Visual Discrimination (DIS), Visual Memory (MEM), Spatial Relationships (SPA), Form Constancy (CON), Sequential Memory (SEQ), Visual Figure-Ground (FGR) and Visual Closure (CLO).

VISUAL PERCEPTUAL SKILLS AND LEARNING

The capability of the brain to make sense of seen objects and scenarios is necessary for building life skills such as reading and interpreting signs and maps. Through the representation of data, proper visual perception helps one to understand and interpret the data and decode meaning from the information. The ability involves recognising numbers, faces, letters and other visual elements (Meronen et al., 2013). It is from these elements that the brain can decode more information for further understanding.

Previous research studies have established a correlation between visual perception and learning ability in children. Children who have poorly developed visual perceptual skills

are likely to be slow learners (Crawford and Dewey, 2008). Even though they may still learn to read and write, the learning process may require excessive cognitive effort.

Cognitive ability can be enhanced through the visual perceptual process, making it easier for one to understand through reading and writing. For instance, when a child reads about an element that he is familiar with, it is easier for him to understand, due to preconceived information acquired through visual perception, making it is easier for one to understand the same scenario or object when it is exposed in class. Also, visual perception prepares one for the understanding of future problems or situations that have a connection or relation to previous and experienced scenarios. For example, visual perception helps in matching the same shapes even when they are made smaller or bigger in size. Knowland et al. (2016) mentioned that the development of these visual perceptual skills is dependent on the magnitude with which a child interacts with his surrounding, especially outdoors. Hence, the relationship that a child makes with his environment is on a par with his visual perceptual ability.

Visual perceptual skills have been shown to correlate with academic performance, particularly in younger children (Goldstand, Koslowe and Parush, 2005; Sortor and Kulp, 2003; Taylor, 1999; Feagans and Merriwether, 1990; Kavale 1982). The areas include learning mathematics, reading, writing and/or spelling. Also, visual perceptual deficits have been documented in numerous studies involving children with learning difficulties including those with reading difficulties (Kovács, 2000) and developmental coordination disorders (Van Waelvelde et al., 2004).

According to Kulp et al. (2004), visual discrimination and visual analysis are vital in performing well in academia, as these skills enable letter or symbol to be perceived and organised correctly in our minds. Additionally, the process of reading is visually demanding, requiring fine spatial discrimination and rapid processing skills (Vidyasagar, 2004).

Goodrich et al. (2007) suggested that visual memory forms the basis of other higher order forms of visual learning. Kulp, Edwards and Mitchell (2002) found that visual memory ability was significantly related to reading, decoding, math, and overall academic achievement. Subsequently, Sortor and Kulp (2003) suggested that low visual perceptual ability may correlate with weak math and reading abilities. Scheiman and Rouse (2006) advocate enhancing visual perception (visual organisation, attention and information processing) in children with perceptual deficits. It can complement the educational process and create building blocks for future academic success. According to Kavale (1982), there is a significant correlation between visual perception and reading. Therefore, visual perceptual skills should be included in the prediction of reading achievement. Hence, it has been proposed that visual perceptual assessment is necessary for those children who struggle in reading or math (Sortor and Kulp 2003).

Studies have shown that better visual span could improve reading and comprehension (Kwon, Legge and Dubbels, 2007; Chung, Legge and Cheung, 2004). Thus, it is imperative to increase efficiency in reading. The various findings suggested that visual processing is highly essential and vital in the development of reading skills.

Stein (2014) has demonstrated the role of the brain and its direct link with dyslexia. Dyslexia is not just about having difficulties with translating letters into sounds; in addition, it involves the challenge of seeing letters and their order. It is important to note that visual perception is different from visual acuity, as one may have sharp vision but still lack good visual perception.

The ability of the mind to make sense of what the eyes see, is salient for various skills such as reading, dressing, writing, painting, answering puzzles, completing math tests, amongst others. These are the everyday skills that everyone takes part in or performs. Meronen et al. (2013) noted that the ability to perform these tasks boosts self-esteem and confidence, leading to positive growth and development. For children, it is essential to have excellent visual perceptual skills as they form the foundation of many other skills that they learn as they interact with the environment. Hence, this study is an opportunity to explore visual processing in children with dyslexia.

METHODOLOGY

Participants

The participants were 30 primary students attending mainstream schools, 19 males (63.33%) and 11 females (36.67%). The majority are Chinese (90%) and the remaining are Malays (10%). Their age ranged from 7-years 9-months to 13-years 5-months, with an average age of 10-years 0-month.

These students had been formally diagnosed with dyslexia by an educational or specialist psychologist. They were recruited from the DAS learning centres, where they were attending intervention programmes. Parents who showed interest in the research gave the consent of participation and provided background information covering medical conditions, history of eye-related examination and diagnoses/treatment. They completed a short questionnaire to highlight whether their child had been assessed previously for visual difficulties related to learning, and if they experienced difficulties which might be related to visual issues.

The Developmental Eye Movement (DEM) Test

The Developmental Eye Movement (DEM) test is a standardised visual-verbal assessment, commonly used to measure eye movement and rapid automatized naming (RAN). It is designed to provide information on vertical and horizontal scanning or tracking

behaviour using number-naming task. Under normal circumstances, it is common to take a longer duration for the horizontal task, and this is only relevant to those up to the age of 13. After that, the tasks should take approximately the same amount of time to complete.

The test comprises of digits only to bypass the issue of reversal of letters. It is a quick and non-invasive test to assess children between 6 and 13 years of age who present with reading difficulties. It takes into consideration of one's automaticity skills, ability to see and read aloud (Garzia et al., 1990). Tracking problems and/or automaticity difficulty can be identified by analysing the results. A tendency to lose your place while reading or copying and to use a finger or marker to keep your place when reading and writing are indicators of tracking or oculomotor problems.

The results can be categorised into four types (Table 1).

Table 1: Categorization of Type I to Type IV

CATEGORY	RESULT	INDICATIONS
TYPE I	Normal horizontal time, vertical time and ratio	Normal (no indication of oculomotor or automaticity dysfunction)
TYPE II	Normal vertical time and increased horizontal time with high ratio	Difficulty in horizontal scanning (oculomotor dysfunction)
TYPE III	Increased vertical time and horizontal time with normal ratio	Difficulty in automaticity of number naming (automaticity dysfunction)
TYPE IV	Increased vertical time and horizontal time with high ratio (combination of type II and III)	Oculomotor and automaticity dysfunction

Test of Visual Perceptual Skills (non-motor) 4th edition (TVPS-4)

The Test of Visual Perceptual Skills (non-motor) 4th edition (TVPS-4) is a standardised test that is commonly used by many professionals to assess two-dimensional visual perceptual abilities. The TVPS designs are bold and presented in a multiple-choice format. Also, the forms are not language or culture related. The test only requires minimal verbal or motor (pointing) response. Hence, it is suitable for those with learning difficulties, low intellectual ability, impairments in speech, hearing, motor or neurological functions. It is an easy-to-use and quick to score assessment to provide information about a child's strengths and weaknesses in performing tasks associated with visual

information processing (Martin, 2017; Martin, 2006; Gardner, 1996). The latest updated 4th edition (TVPS-4), includes a broader age range for examination, from 5 to 21 years old.

The test consists of seven subtests, visual discrimination, visual memory, spatial relationships, form constancy, sequential memory, visual figure-ground and visual closure. The subtests start from the most fundamental skills to the more advanced skills, with 18 plates in each area. It is administered individually with a built-in easel, so that the examinee can look straight ahead, instead of downward viewing. It is untimed, requiring about 25 minutes to complete.

Both assessments were conducted by the researcher, a qualified optometrist, in English (first language in all mainstream schools), on an one-to-one setting in a quiet room with good lighting. The participants went through the DEM test followed by the TVPS-4. Short and simple verbal instructions were used to improve understanding. Administration of assessments only began when the participant had fully understood the instructions.

RESULTS

Questionnaire

The participants were studying in Primary 2 to Primary 6, where five of them entered primary school one year later than their peers. Four of them were born prematurely. Based on the questionnaires returned by the parents, only 63.33% of the participants had been to an eye exam, excluding eye screening by HPB at school. Eleven (36.67%) of them had an eye examination by either an ophthalmologist or optometrist, with 16.67% by an optician and 10% were not sure who conducted the examination. The remaining participants (36.67%) did not undergo a routine eye examination. Seventeen (56.67%) of them wore glasses. Sixty percent (60%) of the parents noticed that their child tends to leave out or confuse words when reading, and 23.33% of the parents mentioned their child has poor eye-hand coordination.

The Developmental Eye Movement (DEM) Test

In the DEM test, duration data were recorded in seconds. The adjusted vertical time (AVT), adjusted horizonal time (AHT) and ratio (AHT divided by AVT) were calculated and rounded to two decimal places. These results were compared to the corresponding age groups based on U.S. normative data, in the absence of local normative data. According to Richman (2009), a score below the 31st percentile is considered to be a weak performance and at risk. Hence, any score lower than 0.5 standard deviation below the mean was categorised as 'poor' performance. Among the participants, 10 (33.33%) and 12 (40%) scored poorly in AVT and AHT respectively. In 9 (30%) cases, the participants displayed a poor ratio.

In relation to the categories in Table 1, 43.33% of the participants had normal eye movement (Type I). 23.33% of them showed difficulty in horizontal scanning (Type II) while 30% had difficulty in automaticity of number naming (Type III). One of them was found to have difficulty in both horizontal scanning and automaticity of number naming skills (Type IV). In terms of the severity of these deficits, 4 participants had percentiles ranks of less than 1, the most severe categorisation on AVT, 2 participants on AHT, and 2 participants on ratio. This suggests that those participants who showed deficits on this test had highly significant impairments, which may well impact severely on their learning.

Test of Visual Perceptual Skills (non-motor) 4th edition (TVPS-4)

For the TVPS-4, a scaled score of 10 indicates that the child's performance lies at the mean score for the sample age group while a scaled score of 7 indicates the child's performance is one standard deviation below the mean for that group. Interestingly the range of scores was broad across each subtest, with scaled scores ranging from a low of 1 to a high of 16. The distribution of scores are presented in Figure 1 to 7. The mean and standard deviation of each subtest are presented in Table 2.

For the overall standard scores, 100 indicates the mean and median with a standard deviation of 15. Figure 8 illustrates the score for the individual participant. Despite this, the overall standard scores are ranged from 93 to 122, and fell within the average to superior range, except for 2 participants.
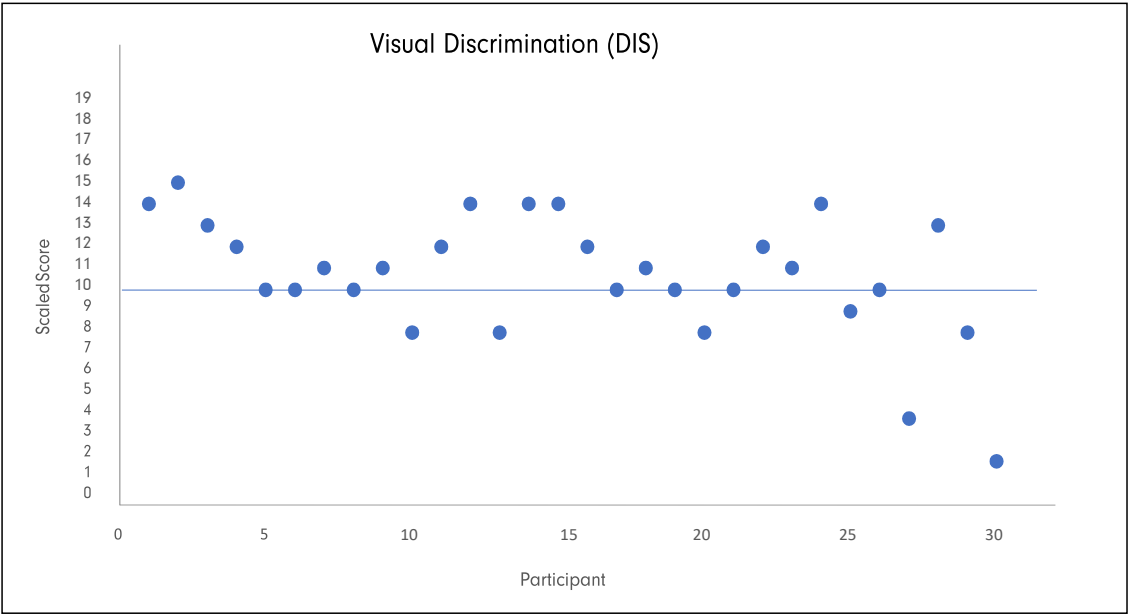
Figure 1: The scaled scores of visual discrimination for individual participants.
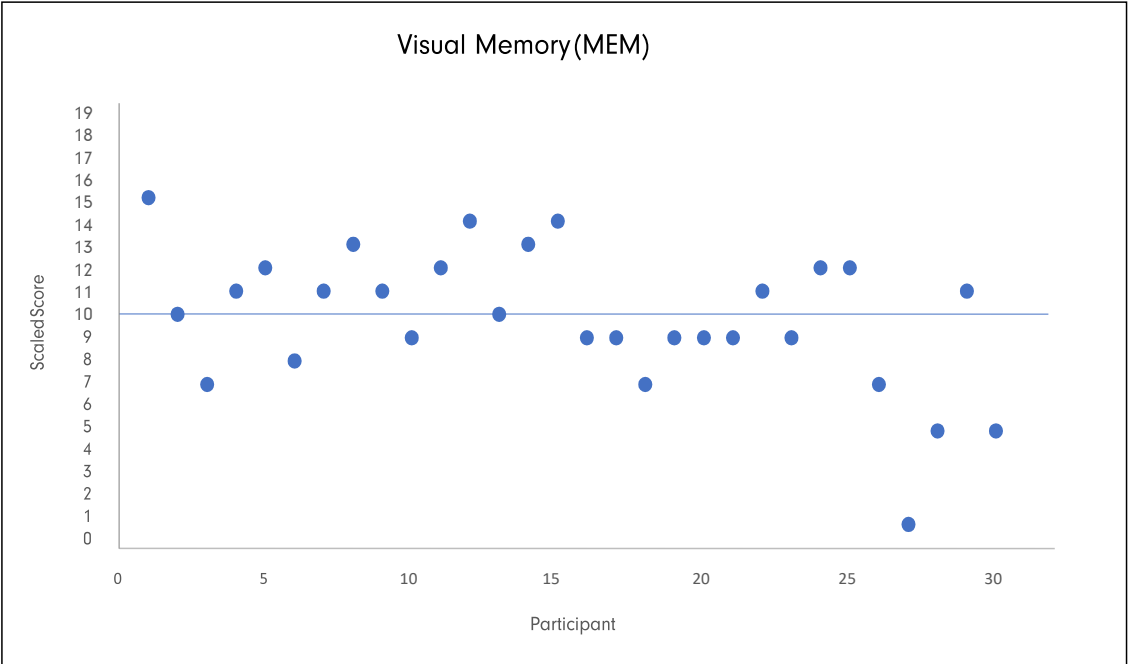
Figure 2: The scaled scores of visual memory for individual participants.
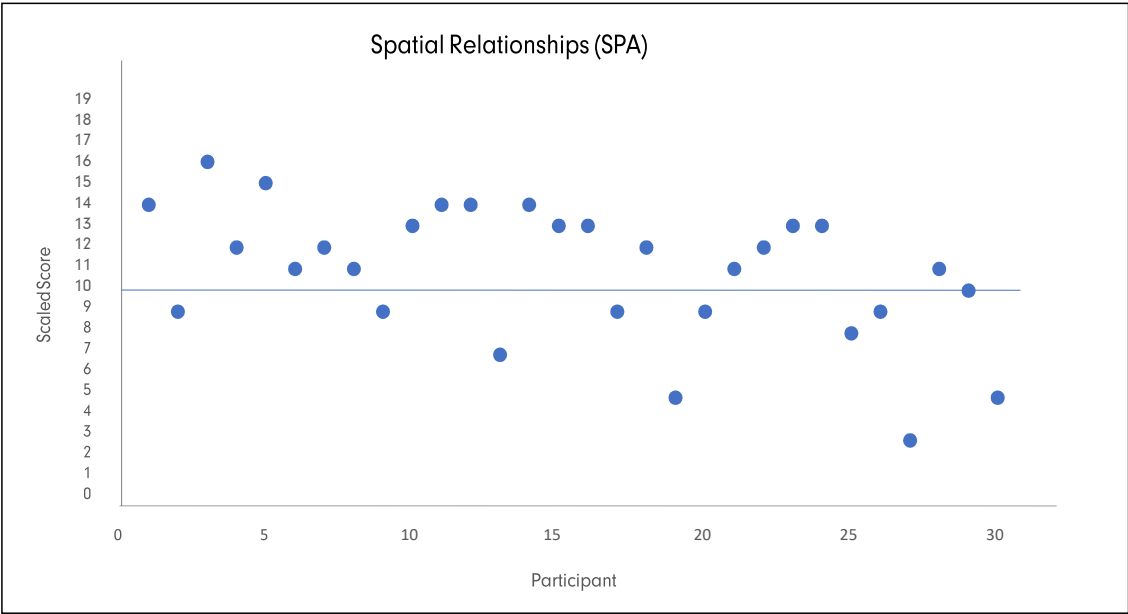
Figure 3: The scaled scores of spatial relationships for individual participants.
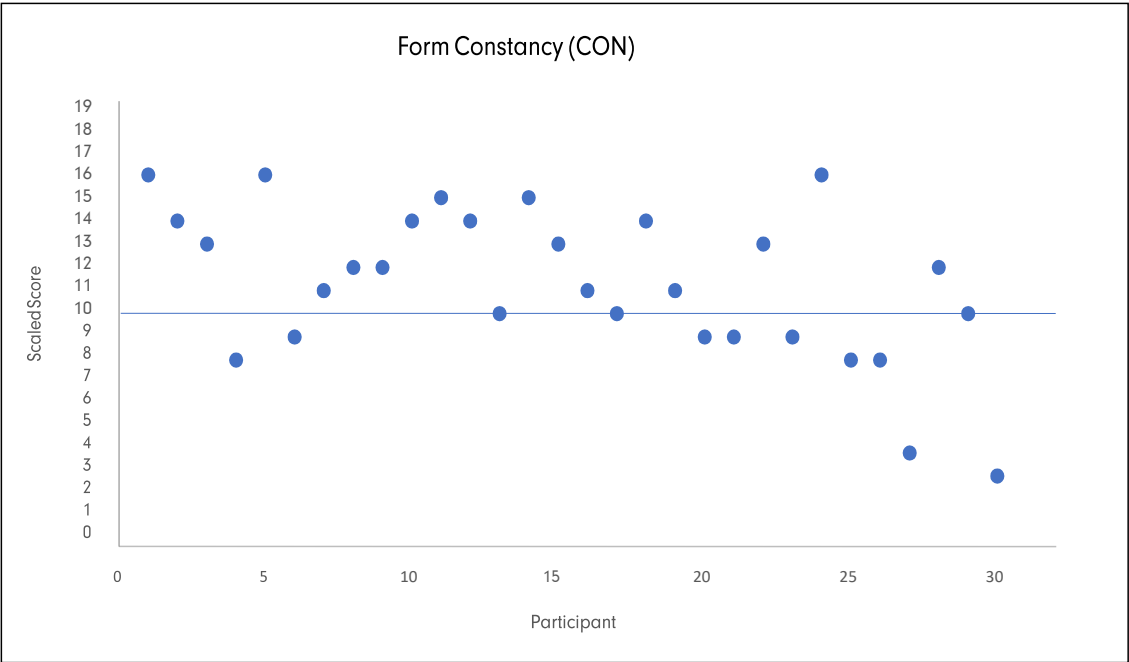
Figure 4: The scaled scores of form constancy for individual participants.
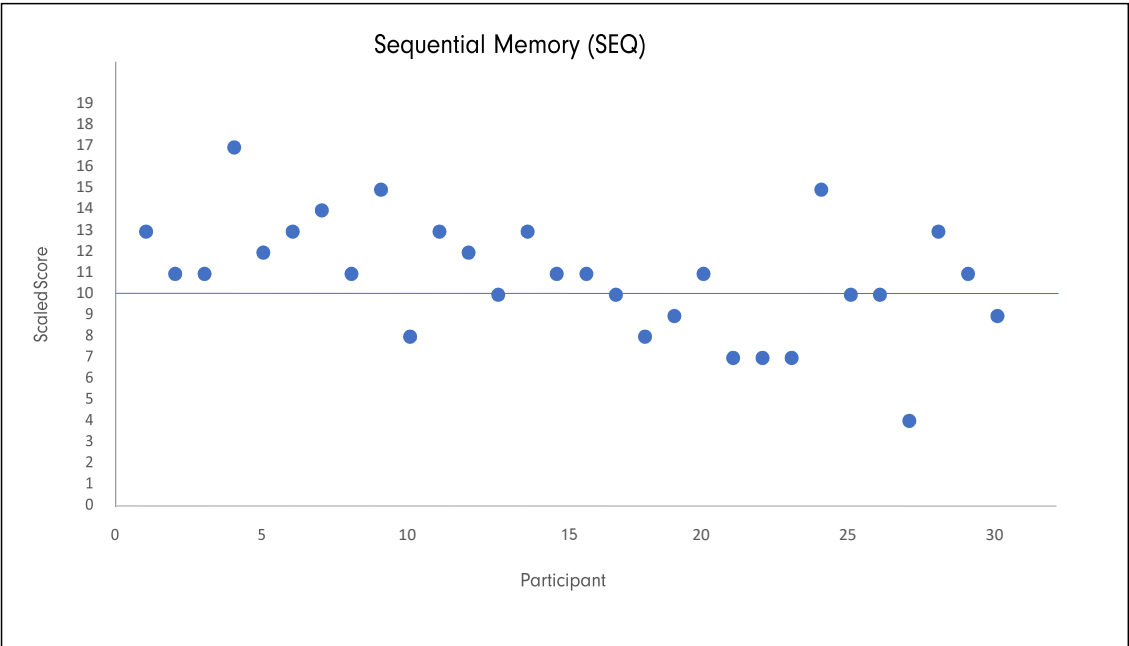
Figure 5: The scaled scores of sequential memory for individual participants.
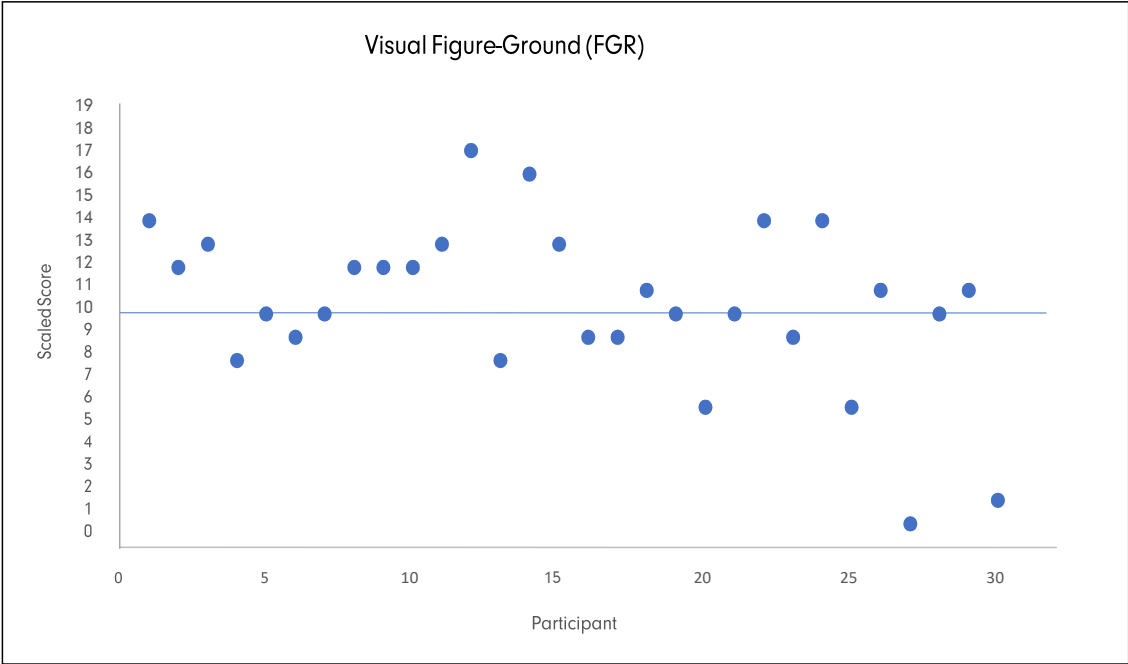
Figure 6: The scaled scores of visual figure-ground for individual participants.
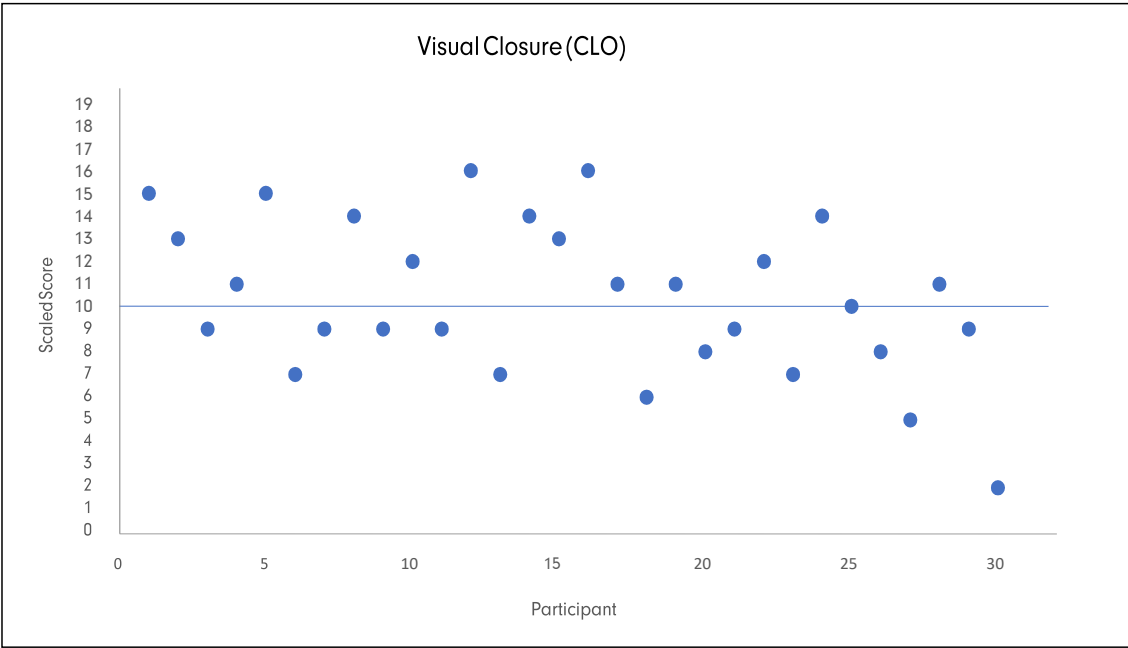
Figure 7: The scaled scores of visual closure for individual participants.
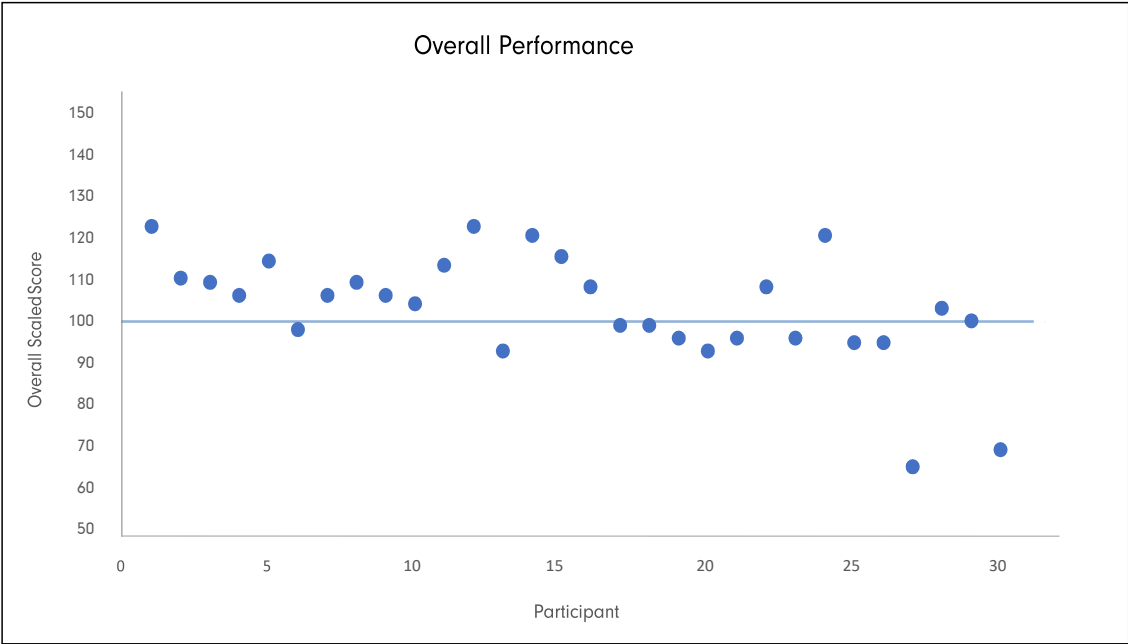
Figure 8: The overall standard scores for individual participants.

Table 2: Mean and standard deviation of the TVPS-4 subtests.

Subtest	Mean	Standard Deviation
Visual Discrimination (DIS)	10.67	2.92
Visual Memory (MEM)	9.83	3.02
Spatial Relationships (SPA)	10.90	3.12
Form Constancy (CON)	11.30	3.29
Sequential Memory (SEQ)	10.87	2.79
Visual Figure-Ground (FGR)	10.40	3.54
Visual Closure (CLO)	10.40	3.43

DISCUSSION

Visual deficits may potentially be one of the contributing factors which affects the learning ability of a child in a negative manner. Therefore, vision conditions should be taken into account in underachieving children. There has been no research that investigates the possible presence of eye movement or/and visual perceptual deficits in children with dyslexia in Singapore. The results of the questionnaire showed that about two-thirds of the participants had been to an eye examination. Nevertheless, among these, barely half of the eye examinations were conducted by an ophthalmologist or optometrist. This provided the motivation for this study.

The Developmental Eye Movement (DEM) Test

Previous research studies have suggested that RAN is linked to reading abilities in children (Koponen et al., 2013; Norton and Wolf, 2012). However, due to the descriptive nature of this study, a causal relationship between RAN deficits and dyslexia cannot be confirmed. Also, this design does not determine if reduced RAN causes reduced reading ability, or vice versa; as well as taking into consideration if both variables are non-causal correlates.

According to Wolf et al. (2002), phonological processing has been the core area of focus in the reading research, as phonological deficit was anticipated to link to reading difficulties, affecting word recognition skills and reading fluency. However, there are certain parts of reading disabilities that are not entirely explained by phonological awareness alone, for instance, children with reading difficulties are not able to improve despite following phonological-based interventions (Wolf, Bowers and Biddle, 2000).

Rapid naming is dependent on the automatic visual processing of the stimulus, resulting in quick word recognition (Becker, Elliott and Lachmann, 2005; Wolf and Bowers, 1999). A wide range of evidence has started to show that a deficit in RAN is associated with reduced reading ability, forming an alternative theory of reading disability (Wolf and Bowers, 1999). In this double-deficit hypothesis, phonological deficit and RAN deficit are two independent sources of reading difficulties, even though both can arise concurrently. Also, it has been suggested that RAN indicates the automaticity which letter codes are retrieved in memory, coupled with requiring this process to automatize the reading process (Spring and Davis, 1988). The findings of this study coincide with the research mentioned that reduced RAN skills may be associated with dyslexia.

According to Fischer and Hartnegg (2008), 20% to 70% of children with dyslexia (age range of 7 to 17 years old) may have deficits in voluntary saccade control. Their findings are consistent with another research conducted on poor readers in American High schools using the DEM test (Powers, Grisham and Riles, 2008). They found that poor readers may well be at risk for poor saccadic tracking skills. Moiroud et al. (2018),

discovered that children with dyslexia have longer fixation durations at the DEM test when compared to children without dyslexia based on chronological age-matched, significantly correlate to the number of words read in one minute with the time taken to read horizontal task. Their study further affirmed that the DEM test is useful in investigating oculomotor behaviour of children with dyslexia.

During the DEM test of this study, 23.33% of the participants did try to use their finger to point or made head movements, especially when reading the letters horizontally, indicating difficulty in saccadic eye movements. One of the participants displayed the two behaviours, struggled to complete vertical task and horizontal task, scoring below one percentile rank in both subtests. Hence, observations of parents or/and educators are important, in spotting any child with these symptoms and subsequently referring them for further assessments. Solan and Ficarra (1990) stated that the eye movement component could not be the only variable in reading problems; they suggested a more inter-disciplinary approach when attempting to improve reading problems.

According to Thaler et al. (2009), children with dyslexia showed different eye movements when compared to children with dyslexia and attentional deficits. They suggested that it is necessary to control comorbid attentional issues in children with dyslexia. Only one participant in this study had comorbid attention deficit hyperactivity disorder (ADHD). However, the participant showed normal eye movement. Hence, comorbidity may not be the factor affecting the DEM test results. Future studies are essential to further investigate the eye movements in these two groups of children.

The DEM test was designed to evaluate saccadic eye movements in a simulated reading setting. When Ayton et al. (2009) compared the validity of the DEM test for measuring the saccadic eye movements with a direct objective eye movement tracker (ReadAlyzer™ or Visagraph™), they suggested that the DEM test did not correlate directly with saccadic eye movements. They found that the DEM test correlates to verbalisation speed, reading performance and visual processing. However, Lack (2005), supported the time scores of the DEM test significantly correlated to Visagraph™ Number Test. Hence, the DEM test remains as a promising measurement to identify potential reading related eye movement deficits.

In this study, even though an experienced examiner administered the DEM test, there are other factors to be considered (Pang, Lam and Woo, 2010). The other possible factors not related to oculomotor or automaticity deficits, which may exist, are intrinsic population characteristics, language differences, educational system and cultural environments (Facchin, Maffioletti and Carnevali, 2012; Baptista et al., 2011; Pang, Lam and Woo, 2010). Thus, these factors must not be overlooked.

In theory, the DEM test is a visuo-spatial test independent of language, to evaluate ocular movements in reading. However, due to a significant component of naming in the

test, computable between 64% and 90%, it was suggested that language would influence the test outcome (Facchin, Maffioletti and Carnevali, 2011). Children who experience language difficulties may have reduced RAN skills (Hatch, Pattison and Richman, 1994). A language background other than English may affect the RAN performance (vertical subtests), as recent studies have found that the DEM test results are dependent on language (not only speech) (Facchin, Maffioletti and Carnevali, 2012; Baptista et al., 2011; Pang, Lam and Woo, 2010), rejecting the previous assertion that the DEM test was independent of language (Fernandez-Velasquez and Fernandez-Fidalgo, 1995).

Also, different age of learning to read, reading attainment, educational systems, developmental curve, length of word numbers, cultures and other aspects can result in different test norms. Different normative values may be found among different populations, even with the same language, such as in United Kingdom (English) or Latin America (Spanish or Portuguese) (Facchin, Maffioletti and Carnevali, 2012). Hence, a different normative value is essential for each population to ensure a valid and reliable DEM test result (Facchin, Maffioletti and Carnevali, 2012; Baptista et al., 2011; Pang, Lam and Woo, 2010; Okumura and Wakamiya, 2010).

As compared with those of the U.S., the participants were exposed to different languages, educational system, social practises and other undetermined influences. Under Singapore's Educational system, English is the primary medium of instruction and used in all school subjects except during Mother Tongue lessons (Dixon, 2005).

Although almost all Singaporeans are bilingual, these children may be better at or prefer to use their mother tongue. Thus, from clinical perspectives, it is debatable that the norm for bilingual children may be different from language-specific norms due to language influence. However, the information regarding the preferred language used was not obtained in this study. Based on the present design and findings, the exact factor/s which might account for the DEM test scores are unknown.

Even though the DEM test is reliable, and horizontal time can be used as a global measure of visual processing speed to predict reading problems (Facchin, Maffioletti and Carnevali, 2011; Orlansky, 2011; Richman 2009), caution is necessary when interpreting data from a single test administration. The test results should be analysed together with other clinical findings and patient history, and not used as an independent test purely based on a single pass or fail threshold (Orlansky et al., 2011; Richman, 2009). In the case of suspected learning difficulties, the DEM test could not be used as a definitive diagnosis, and a full evaluation is essential (Facchin, Maffioletti and Carnevali, 2012; Richman, 2009).

Test of Visual Perceptual Skills (non-motor) 4th edition (TVPS-4)

The results found in this study are much better than the previous research study which

found 70% of the children with dyslexia scored below average for visual discrimination, visual memory, sequential memory and visual figure-ground (Garje et al., 2015). The mean of each subtest is also above 10, except for visual memory, with a mean of 9.83 and a standard deviation of 3.02. Overall, these results are much higher (better) than the previous findings in children with dyslexia (Fusco, Germano and Capellini, 2015).

In order to consider the importance of the pattern of results, it is important to establish how many children suffer from a deficit with sufficient severity that impact their learning. Four of the five participants who entered primary school one year later than peers, showed poor visual memory. Two of them presented prominent weakness in almost all areas of visual perceptual skills, and scored below the 10 percentiles for overall performance. Their performance may have skewed the results; this may be attributed to other possible underlying difficulties, due to their overall developmental delay rather than dyslexia, which is not within the scope of this study.

Four of the participants were born prematurely, half of them showed visual perceptual weakness in at least one subtest. This is consistent with studies suggesting that children who were born prematurely are at risk for visual-perceptual and visual memory deficits, despite adequate cognitive and motor development (Molloy et al., 2014; Molloy et al., 2013). Although visual perceptual deficits can be subtle (Davis et al., 2005), these children may have poorer academic achievements (Geldof et al., 2012). Hence, early identification and remediation are highly essential and helpful to these children.

Multiple studies have found that the link between visual perception and academic performance occurs in earlier grades. In a meta-analysis of 161 studies, involving the study of visual perception, visual memory and visual discrimination have a more significant impact on reading skills in preschool and primary levels, between 16-30% of the variance. It is insignificant for those children at intermediate levels, supporting that visual perception is more vital to reading ability at earlier grades (Kavale 1982). In a study involving 66 children with learning disabilities over three years, visual discrimination problems were found in some poor readers; it can persist and lead to poor achievement throughout elementary school (Feagans and Merriwether, 1990).

This is evident in those participants who entered primary school one year later than peers, as 80% of them showed weaker visual memory, more prominent than in other participants, which in turn, may have affected their higher order visual perceptual skills. Hence, future studies are necessary to investigate their needs further and take into account other possible underlying causes contributing to their difficulties.

The understanding of the prevalence of reduced visual perceptual skills is invaluable, as functional implications of poor visual information processing skills are related to reading difficulties. Gabrieli and Norton (2012) suggested that visual-spatial mechanisms have a direct influence on the growth of visual coding of print (orthography). Furthermore,

Vidyasagar and Pammer (2010) had proposed that dyslexia may be caused by an issue in visual processing other than phonological deficits, as vision depends on normal input from the visual system. Although studies had mentioned that poor visual perceptual skills can be predictors of reading and math abilities, the precise impact remains unclear (Franceschini et al., 2012; Facoetti et al., 2010; Krajewski and Schneider, 2009).

Although studies have shown a correlation between visual perceptual and academic achievement, it is not without some controversy. A few studies have found weak associations when comparing visual perception and academic achievement. In1985, Helveston and colleagues compared academic achievement with visual functions in 1,910 children in grades 1-3 and concluded that there was no significant link between visual functions and academic achievement. However, the incidence of vision problems found in the study was lower than average, and the criteria for the children in reading groups was too simplified and subjective (Stolzberg, 1986). Nevertheless, a more inter-disciplinary approach is widely preferred when evaluating and remediating academic achievement. Auditory and visual perceptual skills are both crucial in the development of reading skills (Johnston et al., 1990). Overall, it has been mainly accepted that many visual factors, including visual perception, contribute to poor academic achievement. Thus, when attempting to remediate reading performance or other poor academic performance, it has been suggested to involve a more inter-disciplinary approach.

In terms of attention, even though a break was given before the test, 36.67% of them did show a sign of loss of concentration and required prompting to stay focused. The lack of focus may be attributed by tiredness, as the assessments were done before or after their lesson at the respective DAS learning centres, after school hours.

When we are fixating on an object, our eyes continue to move, and we are not aware of these fixational eye movements (microsaccades, drifts, and tremor). These fixational eye movements help to stimulate the firing of visual neurons when we fixate to a stationary item, in order to retain our vision. According to Martinez-Conde, Macknik and Hubel (2004), fixational eye movements play an important role in visual perception; when fixational eye movements are hindered, our visual perception fades due to neural adaptation. Although microsaccades are the easiest and biggest to distinguish, these eye movements may occur a few times per second. Hence, it remains challenging to measure fixational eye movements. Future studies with better techniques can further explore the relationship between fixational eye movements and visual perception.

Brown and Peres (2018) suggested that TVPS-4 needs to have other cross-cultural validation to ensure appropriate clinical interpretation of scores when used in other countries. Also, performance in visual perception may be influenced by ethnic, socioeconomic status, as well as different language backgrounds (Lai and Leung, 2012; Dunn, Loxton and Naidoo, 2006). Studies have shown that children from higher

socioeconomic backgrounds tend to attain better scores than children from middle and low socioeconomic backgrounds (Dunn, Loxton, and Naidoo, 2006). All participants attended local mainstream schools and have the same education system. However, the information regarding language background at home and socioeconomic status were not obtained. Also, IQ was not controlled in this study.

Based on the findings, the recommendations are as follows:

- ♦ Provide training to professionals who are involved in children with dyslexia, to raise their awareness and enable them to identify those who likely to benefit from a further visual investigation.
- ♦ Educational psychologists may consider including the DEM test as a screening tool for eye movement and visual perceptual test as part of the assessments for children with dyslexia who display visual difficulties.
- ♦ Raise public awareness with regards to the difference between various eye care providers so that they can make a better-informed decision based on the level and type of eye care that they require.
- ♦ Routine eye examinations by ophthalmologist or optometrist are recommended for all children with learning difficulties. If vision problems persist, then a more in-depth specialised visual assessment is advised for further investigation.

CONCLUSION

This study gives an insight into the eye movement performance and visual perceptual skills in children with dyslexia in a local context. Also, the results have suggested that both visual deficits are present in this group of children, with 56.67% of them showing eye movement deficits and 46.67% of them displaying visual perceptual weaknesses. These findings are consistent with previous research that children with dyslexia may show deficits in eye movement performance or/and in visual perceptual skills. Hence, eye movement and visual perceptual deficits may be the potential underlying causes of learning difficulties in these children. Although the results may be attributable to a possible bias of parents who showed interest in this study, as 60% of the parents did notice their child seemed to have difficulties, such as a tendency to leave out or confuse words when reading.

Seven of the participants displayed both visual deficits. However, the type of eye movement deficits and the area of visual perceptual weaknesses involved were varied. Also, fixational eye movements were not included in this study. Hence, no correlation can be established between eye movement performance and visual perceptual skills in this study. Nevertheless, it is clear from the current study that a few of the participants who have problems with visual deficits may show a particularly severe pattern of difficulties, which is bound to impact their learning significantly.

LIMITATIONS

As an exploratory study, there were numerous limitations. Firstly, the results and findings obtained may not be generalizable due to the small sample size of 30 participants and the sampling techniques. The participants were recruited through convenience, non-probability sampling. Their participation were not random, and their parents were more likely to give consent for their child to take part in the research as they may have suspected visual difficulties in their child. As more than half of the participants did show visual deficits, future studies are necessary to compare eye movement performance and visual perceptual skills between the normal population (control group) and those with dyslexia.

Secondly, the participants' cognitive, IQ, literacy and phonological abilities were not assessed or available for direct matching due to confidentiality of psychological reports. The participants were from the DAS learning centres, studying in mainstream schools in Singapore, so it was assumed that they had average intelligence. Furthermore, there was no control group for direct comparison. Hence, future studies should include a more comprehensive selection and assessment criteria for both experimental group and control group.

Thirdly, this study was not able to control the actual demographics of the participants. There is no direct matching of the participants to the actual statistical population of children with dyslexia in Singapore. Also, confounding factors such as family background, parental educational levels, language used at home and socioeconomic status were not strictly controlled. These factors may affect both results; hence, future studies may take into account these aspects and address the possible impacts of family background on the children's performance.

Finally, although the participants were required to wear their habitual optical correction if available, other visual factors such as visual acuity, vergence and accommodation were not controlled in this study. Although previous research studies have shown that the DEM test was not related to uncorrected refractive errors, visual acuity and binocularity (Kulp and Schmidt, 1998), other inclusion criteria for future studies include: near monocular and binocular visual acuity better than 20/25 Snellen (or 0.8 decimal) acuity; normal range of amplitude of accommodation and stereopsis; and no obvious binocular anomalies (strabismus or large phoria). The DEM test was published to asses saccadic eye movements, without evaluating fixations. Although it is desirable to measure both components directly when reading, the clinically available instruments are expensive and inefficient to conduct during screening or routine eye examination. Hence, the DEM test remains as a useful screening tool. Nevertheless, future research studies can incorporate fixational eye movements to better understand the relationship between these eye movements and visual perception.

As an exploratory study, no conclusions on any cause and effect as well as relationships could be formulated. The associations observed can only indicate that there is a possibility that eye movement deficits and visual perceptual weaknesses may be present in children with dyslexia, and for some children these will be severe. Therefore, taking into account the above limitations, future studies with better research design and methodology is needed to investigate the actual eye movement performance and visual perceptual skills of children with dyslexia in Singapore. Further research may be considered to investigate the effectiveness of integrating additional accommodations or/and interventions for children with visual deficits. For example, enlarged printed materials, with proper spacing between words and lines, to minimise visual distractions.

This study has highlighted that visual difficulties involving both eye movement and visual perception are prevalent in children with dyslexia in Singapore. The deficits are more prominent among those who were born prematurely and entered school one year later than peers. Hence, this requires immediate attention.

During reading, our eyes are required to scan across the page, along a line of words and move back to the beginning of the following line. These actions require accurate and precise eye movements, and also a timely facility to process information. Any difficulty in this aspect may hinder reading. Hence, a routine eye examination is essential whenever there is any doubt about possible visual deficits. The existing protocols established by The College of Optometrists, British and Irish Orthoptic Society (BIOS), and American Optometric Association (AOA) can be used as a guideline, in setting up our local standards of practice for assessment and management of the visual deficits in children with specific learning difficulties.

Furthermore, visual perceptual skills may influence functional skills and academic outcomes, with increasing evidence that individuals with reading or math learning difficulties have poorer visual perceptual skills. Children who showed significant visual perceptual deficits might benefit from enlarged printed materials, with proper spacing between words and lines, to minimise visual distraction and optimise learning. Scheiman and Rouse (2006) advise that the treatment of underlying perceptual deficits is complementary to any educational process and this should improve the visual organisation, information processing and attention of children who have visual difficulties. By improving visual perception at a young age, we could help create building blocks for future academic success in children with visual perceptual deficits. Hence, visual perceptual training should be incorporated for those in need.

Since visual deficits in children do not disappear as they grow up and tend to remain into adulthood, they may continue to struggle visually when reading; this may have adverse effects on reading motivation and performance. Therefore, the implementation of strategies to deal with visual deficits is likely to enhance the reading fluency as well as the speed of learning. By removing the impact of dyslexia on reading difficulties, it may

be beneficial in improving self-esteem (Burden, 2008). In the long-term, this may probably be more cost effective and decrease the amount of time in providing intervention for this group of children.

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The Effect of Wearing ChromaGen Lens II on Visual Stress, Binocular Visual Functions and Reading Performance in Children with Dyslexia

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Abstract

Dyslexia is a neurodevelopmental disorder that primarily affects reading ability. There are many anecdotal claims that coloured lenses and overlays improve reading performance. However, the effectiveness is still controversial. This study aimed to compare visual stress levels, binocular visual functions and reading performance on children with dyslexia without and with the second generation of ChromaGen lens (ChromaGen lens II). A total of 28 children with dyslexia were invited to participate in this study. All subjects were free from ocular and systemic diseases and never had any visual intervention for their dyslexia problem. The study involved pre -and post-assessments of visual stress, binocular visual functions and reading performance without and with ChromaGen lens II wear. Each individual subject chose their own preferred colour of the Chromagen lens II. For both pre-and post-assessments, the subjects completed a computerised visual stress test (Lucid ViSS) and a series of binocular visual function tests (stereopsis, amplitude of accommodation, fixation disparity, lag of accommodation and near point of convergence). The reading performance was assessed based on reading rate and time. The results for visual stress showed no significant difference with and without wearing the ChromaGen lens II (Z = -1.107, p = 0.268). There were no significant differences in other binocular vision functions except for stereopsis (Z = -4.413, p = 0.00) with and without wearing ChromaGen lens II. There were also no significant improvements in reading time (Z = -0.159, p = 0.873) and reading rate (Z = -1.0.47, p = 0.295) with and without wearing the ChromaGen lens II. The findings suggest that ChromaGen lens II does not improve reading performance in children with dyslexia. It also does not change most binocular vision functions except stereopsis.

Keywords:　Dyslexia, visual stress, reading, coloured lenses, binocular visual performance

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INTRODUCTION

Dyslexia is a Specific Learning Disorder (SLD) with impairment in reading. It is a type of neurodevelopmental disorder. Individuals with dyslexia have difficulties with word identification because they have poor ability in decoding and spelling (Nourbakhsh et al., 2013). About 80% of people with learning difficulties have dyslexia (Waijuihian & Naidoo, 2011).

Globally, 10%-15% of the population is affected by dyslexia (International Dyslexia Association, 2010). In Malaysia, it has been reported that 10%-15% of the primary school children have symptoms of dyslexia (Nordin, 2015). According to the statistics of the Department of Special Education, Ministry of Education Malaysia, there are about 314,000 children in Malaysia who are suffering from dyslexia (Nor Afzan, 2006). According to the Ministry of Education Malaysia, on average, there is one dyslexia case identified in every 20 students (Komala, 2004).

Children with dyslexia have cognitive function deficits in the higher-order processing or executive control processes, such as, spoonerism, verbal categorical and phonological fluency, visual-spatial and auditory attention, verbal and visual short-term memory and verbal working memory (Brainard 2005; Varvara et al., 2014), poor visual attention span that greatly affects their reading skill (Talcott et al., 2000), difficulties with memorizing (Thomson, 1984) and letter identification (Czaplewska et al., 2011). There are also significant deficits in phonological processing, verbal working memory and processing speed (Hayenga et al., 2009).

Apart from that, these children always report to have difficulty concentrating during reading. They report that the words or letters seen are blurred, double and shake when reading. Headache and eye-strain during reading have also been reported by children with dyslexia. Some of them have difficulty reading under bright light because of glare. The same symptoms have been reported by individuals with visual stress. According to a study, the prevalence of visual stress is high amongst individuals with dyslexia (Singleton & Henderson, 2007). The study also shows that 41% of children with dyslexia had visual stress.

Visual stress is the inability to see well without any interference (Wilkins 1995). When a person experiences visual stress, the ability to read for a long time is interrupted. The theory that link dyslexia and visual stress is hyper-excitation of the visual cortex. This hyper-excitation is caused by extreme sensitivity to contrasts or patterns that dazzle while reading (Wilkins et al., 2004) whereby the visual neurons fire inappropriately (Wilkins, 1995).

Children with dyslexia encounter various difficulties. Therefore, it is vital to have structured effective interventions. Most of the interventions have focussed on teaching

methodologies. A systematic review of research done in improving reading using coloured lenses and overlays have been published in 2016 (Griffiths et al., 2016). The study reported that majority of studies were subject to 'high' or 'uncertain' risk of bias in one or more key aspects of study design or outcome, with studies at lower risk from bias providing less support for the benefit of coloured lenses/overlays on reading ability. The study also noted that while many studies reported improvements with coloured lenses, the effect size was generally small and/or similar to the improvement found with a placebo condition.

The general objective of this study was to compare visual stress levels, binocular visual functions and reading performance on children with dyslexia without and with the second generation of ChromaGen lens (ChromaGen lens II).

METHODS

Participants

The subjects consisted of children with dyslexia aged 7 to 12 years and were selected from two Dyslexia Centres in the Klang Valley. Subjects had met the following selection criteria; have normal visual acuity of 6/9 or better with best correction of refractive power or emmetropia, free from ocular and systemic disease and never had any visual intervention for dyslexia.

This study was approved by the Ethics Committee of Universiti Kebangsaan Malaysia and followed the tenets of the Declaration of Helsinki in using human subjects. The purpose and procedure of the study was explained to the parents and the participants. Written informed consent was obtained prior to commencement of the study. The sample size was calculated using the Cochran (1963) formula. The sample size required was 27 subjects after taking into account the dropout of subjects. A total of 41 children with dyslexia were screened for this study. However, it was found that only 28 children with dyslexia met the selection criteria and were given permission by the parent/guardian to participate in this study.

Procedure

Before the study began, a comprehensive eye examination was performed on all subjects. This included assessment of visual acuity for distance and near, retinoscopy, and subjective refraction, the amplitude of accommodation, near point of convergence and ophthalmoscopy. Subjects who fulfilled the inclusion criteria were then recruited into the study. First, a pre-assessment was conducted, followed by a selection of ChromaGen lens II and finally post-assessment was done.

Pre-assessment

The pre-assessment was conducted after the completion of the comprehensive eye examination. If any subject required spectacles or contact lenses, a prescription was given but the pre-assessment was carried out after 2 weeks. This was done to allow for adaptation to the prescription. If the subject did not require any new prescription, the pre-assessment was conducted after a 15 minutes rest period.

The pre-assessment tests consisted of computerised visual stress level assessment, binocular vision function assessment and reading time and reading rate determination. The binocular vision functions that were assessed were stereopsis using TNO, the amplitude of accommodation and near point of convergence using the RAF rule, lag of accommodation using monocular estimation method (MEM) and fixation disparity (FD) using the Mallet Near Unit. This was followed by determining the reading time and reading rate with a standard text. MEM is a form of dynamic retinoscopy used to objectively measure accommodative response at a near working distance. A special near-point card having a central hole was attached to the head of the retinoscope. The card had a paragraph with approximately 6/9 text on the card. The examiner evaluated the retinoscopy reflex with the streak oriented vertically, while the subject read the text on the card adjacent to the central hole. The examiner used lenses to neutralise the reflex motion. The lowest power lens that neutralised the reflex was recorded as the lag of accommodation. The Mallet Near Unit used to measure FD has a central fixation target 'OXO' which is seen with both eyes and two monocular markers in line with the 'X' which is seen with each eye using cross polarising filters. There was also text in the background. The test can measure horizontal fixation disparity and vertical fixation disparity. The subject was asked to wear polarising filters and instructed to first read the text in the background to stabilise the accommodation response on the plane of the Mallet Near Unit. The subject was then directed to see the 'OXO' target and indicate if the two marker lines were aligned or not. If they were not aligned, the examiner placed a prism until the two marker lines were aligned. The minimum prism needed to align the two lines was noted as the fixation disparity.

Visual Stress Measurement

Lucid ViSS (Visual Stress Screener) is an objective computerised test that has been developed to screen visual stress for children from age 7 to adult. The test by ViSS delivered by computer and required minimal supervision. The screening test in the form of word search game, it takes 20-30 minutes to finish. The format and content of a word search game are according to the age of person being screened. This test is done under two conditions; visually stressful and visually non-stressful. The result comes in a graphical scale of susceptibility to visual stress; from 'low' to 'extremely high', and a full statistical analysis is also provided.

The visual stress level is displayed on a 7-point graphical scale which include low, borderline, slight, moderate, high, very high and extremely high. The degree of susceptibility to visual stress measure is according to the following data; the probability level associated with the t statistic, percentage increase in search time from the non-stressful condition to the stressful condition and the effect size. For example, if the t statistic is not significant (i.e., $p > 0.05$) or if the percentage increase in search time from the non-stressful condition to the stressful condition is less than 10%, ViSS will classify the child as having a 'low risk' of visual stress. If, however, the t statistic is significant (i.e., $p < 0.05$ or smaller) or if the percentage increase in search time from the non-stressful condition to the stressful condition is 10%-19% or greater, ViSS will classify the person as exhibiting 'borderline risk' and so on.

Procedure for reading performance

Reading text with the standard distance between words was constructed for this study. Twenty words were randomly selected from a group of syllables to form a more systematic set of words. Syllable consists of a consonant and vowel. Each reading text consisted of 20 unrelated words. Words were printed in Arial font with 16-point size letters. Unrelated reading text consisting of 20 words were printed in the form of five lines with four words in each row. Each set of words was printed on white A4 paper (80 gsm) with 100% contrast.

Reading time was measured according to the length of time needed for the subject to finish reading the text (in seconds). Reading rates are speed needed by subject to read the words correctly (in words per minute). The formula for reading rates is as follows:

$$B = \frac{(20 - \chi) \times 60}{\mathbb{t}}$$

B = rate of reading (the number of words per minute, ppm)
χ = error of reading the word (number of words)
$\mathbb{t}$ = time it takes to read all the words (in seconds).

Unit for the reading time is second (s) while the unit for reading rates is words per minute (wpm). Subjects were required to read the standard text and the results were recorded.

ChromaGen lens II selection

The ChromaGen II lens system comprises of sixteen different shades of grey coloured lenses. The system helps in treating visual distortions by resynchronising the wavelength of light reaching the eyes, which claims to enable the individual with dyslexia to improve

their ability in reading. Besides helping dyslexia problems, the ChromaGen II can also help colour vision deficiency patients. The ChromaGen II lens system gives a better cosmetic outward appearance with neutral tinted colour lenses compared to other colour corrective lenses for dyslexia and colour vision deficiency problems.

The optimum ChromaGen lens II was determined according to the recommended manufacturer's instructions given in the manual. Subjects select their own preferred lens shades monocularly to ensure that each eye receives the best and optimum lens shade. Subjects wore their full prescription. In bright lighting conditions, the dominant eye was determined. The subject was asked to look at the standard reading text placed at 40cm. The ChromaGen lens II was first placed on the dominant eye one at a time. ChromaGen lens II selection began with lens label 1 and ended with lens label 16. The subject was asked to compare the level of text clarity between each lens and asked to state which lens provide the best clarity and comfort while reading. This is chosen as the optimum lens for the patient. The procedures were repeated for the non-dominant eye. Once optimum lenses had been selected for each eye, both eyes now wore the chosen lenses for the following examination.

Post-assessment

Fifteen minutes rest was given to the subject. The subjects then wore their chosen ChromaGen lens II. All pre-assessment measurements of computerised visual stress level assessment, binocular vision function assessment and reading time as well as reading rate were measured again.

RESULTS

A total of 28 children with dyslexia with a mean age of 8.93 ± 0.281 years participated in this study. The mean distance and near visual acuity were both 0.00 ± 0.00 logMAR (see glossary list below). The mean spherical equivalent was 0.01 ± 0.38 D for the right eyes and 0.09 ± 0.43 D for the left eyes, mean amplitude of accommodation was 19.71 ± 1.08 D, mean near point of convergence was 5.07 ± 0.38 mm.

Visual Stress

The visual stress level of children with dyslexia was determined through a computerized visual stress test, Lucid ViSS. Table 1 shows the visual stress levels without and with wearing ChromaGen lens II.

Fifty percent of the subjects (14 subjects) had low levels of visual stress and only 3.6% (1 subject) had high visual stress level. Wearing the ChromaGen lens II seemed to increase the visual stress of subjects to moderate and high levels.

As can be seen from Table 2, the level of visual stress with wearing the ChromaGen lens II was higher (2.39 ± 1.59) compared to without wearing ChromaGen lens II (2.07 ± 1.21). However, Wilcoxon Sign Rank test results indicate that there are no significant differences for visual stress level without and with wearing the ChromaGen lens II ($Z = -1.107$, $p = 0.268$). Similarly, there was no significant difference in search time for both visually stressful and visually non-stressful screen without and with wearing ChromaGen lens II.

Reading performance

Reading time and reading rate of subjects without and with wearing ChromaGen lens II are shown in Table 3. There was no significant difference in reading time and rate without and with ChromaGen lens II. There was a significant difference in reading time and rate without ChromaGen lens II between high and low visual stress levels.

Binocular vision functions

Wilcoxon Sign Rank test was used to test differences in mean stereopsis, amplitude of accommodation, fixation disparity (FD), lag of accommodation and near point of convergence before and after wearing ChromaGen lens II. Test results indicated that there were significant differences in stereopsis ($Z = -4.413$, $p = 0.00$) without and with wearing ChromaGen lens II. However, there were no significant differences in the amplitude of accommodation ($Z = 0.00$, $p = 1.00$), fixation disparity ($Z = 0.00$, $p = 1.00$), lag of accommodation ($Z = 0.00$, $p = 1.00$) and near point of convergence ($Z = 0.00$, $p = 1.00$) without and with wearing ChromaGen lens II. The mean values for stereopsis without and with wearing ChromaGen lens II were 87.10 ± 77.21 sec of arc and 131.61 ± 74.97 sec of arc.

Table 1. Visual stress levels without and with wearing ChromaGen lens II.

Visual Stress Level	Number of subjects (without ChromaGen lens II)	Number of subjects (with ChromaGen lens II)
Low	14	14
Borderline	2	2
Slight	9	3
Moderate	2	5
High	1	4

Table 2. Mean level of stress and mean search time without and with wearing ChromaGen lens II.

	Level of visual stress	Mean search time for visually stressful screen (sec)	Mean search time for visually non-stressful screen (sec)
Without ChromaGen lens II	2.07 ± 1.21	44.30±30.83	35.93±21.94
With ChromaGen lens II	2.39 ± 1.59	33.66±23.02	31.15±23.89
	p = 0.268	p = 0.329	p = 0.055

Table 3. Reading time and reading rate without and with wearing ChromaGen lens II.

Level of stress	Reading time Without ChromaGen lens II	Reading time With ChromaGen lens II	p-value	Reading rate Without ChromaGen lens II	Reading rate With ChromaGen lens II	p-value
Low	56.33±46.14	74.42±55.50	0.685	33.68±23.57	29.03±27.65	0.976
High	110.16±51.41	80.31±57.75	0.584	12.53±9.72	23.43±19.62	0.613
	p = 0.003	p = 0.087		p = 0.001	p = 0.074	

DISCUSSION

In this study, we compared the visual stress, binocular vision functions, reading time and reading rate of children with dyslexia., and also without and with ChromaGen lens II. We found that 50% of the subjects (14 subjects) had low levels of visual stress and only 3.6% (1 subject) had high visual stress level. Irlen (1980) also stated that 46% of individuals with dyslexia suffer from visual stress. It was also seen that wearing ChromaGen lens II seemed to increase the visual stress of subjects to moderate and high levels. Although the level of visual stress with wearing the ChromaGen lens II was higher (2.39 ± 1.59) compared to without wearing ChromaGen lens II (2.07 ± 1.21) it was not statistically significant. Similarly, there was no significant difference in search time for both visually

stressful and visually non-stressful screen without and with wearing ChromaGen lens II. Our study showed that there was a significant difference in reading time and reading rate without ChromaGen lens II between high and low visual stress levels. However, there was no significant difference in reading time and reading rate with ChromaGen lens II between high and low visual stress levels. There was also no significant difference in reading time and rate between without and with ChromaGen lens II for both the high and low visual stress levels. This is different to the study by Lopez (2011) in which reading speed improved in the subjects without visual stress but did not improve in the subjects with visual stress. However, many studies had shown that use of coloured lenses did improve reading performance of subjects with visual stress (Saint-John & White, 1988; Robinson & Conway, 1990, 1994; Robinson & Foreman, 1999a, 1999b). According to Lopez (2011), this improvement could be due to attributable bias in which subjects changed their visual stress response criterion.

To date, only 4 studies have been conducted to determine the effectiveness of ChromaGen lens to improve reading performance. The first study was by Harris and MacRow-Hill (1999) in which a comparison was made between ChromaGen contact lens and a placebo lens carrying a light blue handling tint to improve reading fluency in adults with dyslexia. The study was described as 'double-blind' but the subjects would have been aware of the type of lenses they were wearing. Nevertheless, the research team who conducted the assessments were masked to the group status. The study showed that there was a statistically significant increase of 12 wpm (a 15% increase) relative to the baseline reading rate. Similarly, there was also a significant increase of 7 wpm with the placebo lens (an 8% increase) compared to baseline. However, the improvement in reading rate with the ChromaGen lenses was statistically significant relative to both the baseline reading rate and the improvement seen with the placebo lenses. It was noted that the subjects who received the ChromaGen lenses first before the placebo lenses showed a significantly larger improvement in reading rate compared to those who received the placebo first. There was also bias in that the subjects were recruited through publicity advertising the benefits of coloured lenses.

The study by Cardona et al., (2010) compared reading speed between subjects wearing ChromaGen lenses and a clear placebo lens. The subjects were told that placebo lens had a new invisible tint. The study showed that both placebo lenses and ChromaGen lenses improved reading speed relative to the control group where no lenses were worn. Another 2 studies (Hall et al., 2013; Harries et al., 2015) compared Harries lenses with blue or yellow lenses from the Dyslexia Research Trust (DRT) system. Both studies recruited students from mainstream state primary school, thus, removing external bias. However, both studies had no placebo group or no lens control group. The study method was also not clear as to whether the subjects who chose the filters used it for a continuous 3-month period. At the end of 3 months, both groups showed improvement in reading ability in children with reading delay. Our study also has the same limitation as we had no placebo group.

In our study, most binocular vision functions except stereopsis did not change without and with wearing ChromaGen lenses. The stereopsis of children with dyslexia was reduced after wearing ChromaGen lens II. This could be due to the colour of the lenses.

CONCLUSION

Our study showed that ChromaGen lens II does not improve reading performance in children with dyslexia. However, the results are from immediate effect after wearing ChromaGen lens II. The improvement in reading performance for children with dyslexia maybe significant if these lenses were worn for a longer period.

ACKNOWLEDGEMENTS

We would like to thank the Dyslexia Association for allowing us to conduct this study at their centres. We also like to thank the parents and children at the centre for participating in this study.

GLOSSARY

Dioptre (D)
   A unit of refractive power, which is equal to the reciprocal of the focal length (in metres) of a given lens.

Log MAR
   An acronym for *Logarithm of the Minimum Angle of Resolution*. This describes the letter size scoring from a vision test that uses LogMAR vision chart. LogMAR 0.00 is equivalent to 20/20 vision.

RAF rule
   An acronym for *Royal Air Force Rule*. This ophthalmic tool is used to measure objective and subjective convergence and accommodation. Convergence ability is measured in centimetres and amplitude of accommodation is measured in dioptres.

TNO
   An acronym for *Toegepast Natuurwetenschappelijk Onderzoek* (Dutch), also known as Netherlands Organisation for Applied Scientific Research. The TNO test is developed as a screening test for stereopsis and depth perception and measured in seconds of arc.

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Towards improving the inclusion of a student with autism and ADHD in an international school.

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Abstract

In this article, the author, Head of Learning Support in an international school, presents a study of attempts to improve the inclusion of a student with high functioning autism (HFA) and Attention Deficit Hyperactivity Disorder (ADHD). Following a request from the student for support with disclosure, the methodology involved working with the parents of the student to produce a Powerpoint presentation for students and staff to develop awareness. This was followed by a questionnaire to evaluate any impact of this enhanced knowledge. 21 teachers responded and the viewpoint of students was also sampled. Recommendations to improve understanding for staff and students and implications for further integration are discussed.

Keywords: High Functioning Autism, Asperger's Syndrome, Framework, Inclusion.

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INTRODUCING THE STUDENT

John (name changed) was an American/Vietnamese student in year 9 (aged 14-15) at the international school in Vietnam where the author was Head of Learning Support and primary EAL. John held a diagnosis of High Functioning Autism (HFA) and Attention Deficit Hyperactivity Disorder (ADHD) according to his Education Psychologist's report (EPR), 'requiring support for deficits in social communication and requiring support for restricted, repetitive behaviours', both of which are also characteristics common to Autism (ASD). He was also reported to have:

> *"a high anxiety score... indicating that he internalises much of the anxiety that he experiences and thus may get overburdened with trying to relieve this anxiety. It may also suggest a strong need for [him] to learn to discuss feelings of anxiety and to learn to cope with anxiety in a more open manner by sharing these feelings with others who can help"* (EPR).

This anxiety was expressed when he was unable to cope with aspects of school life demanding co-operation and team work, because of his autism, leading to meltdowns. In discussions, this led to his request for help in developing awareness of his difficulties in both staff and students at his school, which he felt unable to tackle himself, preferring to use his mother and Head of Learning Support as his voice.

While living in the United States of America (USA) John had received Applied Behavioural Analysis (ABA) and Speech Therapy, both of which had favourable results according to his family. He had also been treated with neuro feedback and a Gluten free/Casein free diet for several years, and had also received medication for his ADHD (Concerta), which stabilised his attention effectively. At his previous school (another international school in Vietnam), he had been admitted on condition that he had a full time co teacher (a 'shadow' teacher employed to be with him at all times on a 1 to 1 basis). However, John did not like this arrangement and it culminated in an incident which resulted in him being asked to leave the school, and several schools had refused John admittance before he was finally accepted as a student with us.

John had had some difficulty settling in to mainstream school life, finding some problems with forming and maintaining peer relationships, accessing the full academic curriculum (particularly Physical Education, Music and Drama when he was asked to participate in group or team activities) and challenging the authority of some of his teachers. Art was his favourite subject, and the Art teacher his favourite teacher. He had an area of special interest in art, where he had been developing a complex set of characters, set in a post-apocalyptic future where human-like animals have evolved following a meteor collision with earth. He posted this work on a website with accompanying 'Fan Fiction' and receiving feedback on this website was very important to him.

AIMS AND FRAMEWORK FOR INCLUSION

Recently, Pellicano and colleagues, (Pellicano, Botle and Stahmer, 2018) have discussed their concept of the current illusion of educational inclusion in relation to autism. These authors argue that autistic children are at far higher risk of being expelled from school than their peers. They also note the mismatch between formal recommendations for support, and attitudes and practices within schools themselves. They advocate the need for improved understanding of the social and learning challenges associated with autism, particularly in the noisy and challenging environment of secondary school, with regular transitions which can prove distressing for students resistant to change.

Furthermore, a major review by Bartonek and colleagues, (2018) of nearly 5000 Swedish teachers, including special needs teachers, found that only 6% were prepared to educate students with neurodevelopmental disabilities and only 14% had received education towards this, despite the fact that inclusion is compulsory in Sweden. These studies provide the justification for this study, suggesting the need for a greater awareness of the implications of autism in inclusive schools in order to ensure the best possible outcomes.

It seems that although there is broad philosophical acceptance and support for the principles of inclusion, there are very real concerns among many teachers that it is sometimes difficult to implement, particularly when they are confronted with students whose learning difficulties appear to be obscure or outside of their experience or previous training (Florian and Rousse, 2010).

Although there are indicators that the knowledge base and literature around specific learning difficulties such as Autism (ASD) and Asperger's Syndrome (AS) is expanding, many teachers do not necessarily feel empowered or supported enough to know how to ensure that their pedagogical approaches are truly inclusive or inclusive enough. Florian and Spratt (2013), noted there was currently very little guidance in the literature about how an inclusive pedagogy should be enacted in a classroom setting. Consequently, these authors have taken steps to address this through developing a tool for interrogating pedagogical approaches in light of inclusive principles.

The Framework for Inclusion seeks to measure how teachers enact inclusion in the classroom (Florian and Spratt, 2013) and synthesises the three core themes of inclusive pedagogy, briefly outlined here.

> *Active Professionalism* relates to the professional knowledge of a teacher (Florian and Black Hawkins, 2010) regarding school or wider educational policy (Florian and Spratt, 2013).

Social Justice relates to beliefs about what students can achieve, rejecting ability labelling (Florian and Rousse 2010) or what teachers believe (Florian and Black Hawkins, 2011) about their capacity to support all children (Florian and Spratt, 2013).

Learning and Teaching relates to pedagogical approaches that teachers develop based on their theory and beliefs and the personal relationships that they develop with their students (Florian and Rousse, 2010) or what teachers 'do' (Florian and Black Hawkins, 2011) in turning knowledge into action (Florian and Spratt, 2013).

The author aimed to work within this Framework to interrogate his own and the school's teaching faculties' current ethos and implementation of inclusive pedagogy and practice and how this relates to John and the success or otherwise of attempts to fully include him in the school's learning community. Secondly, to examine the level of understanding of ASD or AS in the student body, particularly John's classmates. This approach has been highly commended in the literature, in Roberts and Simpson, (2016) review of attitudes of key stakeholders, where the level of knowledge and understanding of school staff emerged as the primary issue, with everyone involved indicating the need for further training.

A key issue for John, as mentioned above, was his high levels of anxiety which could manifest in sudden anti-social outbursts. Previously, his classmates had largely been expected to accept this and to make allowances for him without having any knowledge of what led to these seemingly random outbursts. In addition, it was hard for peers to appreciate the high level of tolerance among staff for this type of behaviour, which would be considered completely unacceptable if one of them decided to behave in this way.

The issue of disclosure has been controversial, with costs as well as benefits, however, Critchley, (2016) strongly recommended on Network Autism that "Given how difficult it is to get this right and how high the risks can be of making things worse for a young person, it is vital to start with the creation of a culture of acceptance of difference within which a disclosure can happen safely" The first step in ensuring success for John was to ensure that both staff and fellow students had a better understanding of high level autism to enhance the culture of acceptance.

The National Autistic Society had produced a Resource Pack for school staff in Scotland (2012), which was used to develop a planned activity and discussion with John's class, in conjunction with his mother. This aimed to help them understand this behaviour in the context of John's ASD and the implications in terms of having a disability. The intention was that they come to recognise the positive aspects of John's personality, his daily struggle to make sense of and fit into this world, and that his disability does not define who he is.

RESEARCH QUESTION

In this article, the author investigated models for supporting students in inclusive mainstream schools. In particular, focusing on the support offered to John, with High Functioning Autism (HFA) or Asperger's Syndrome (AS) and how this has challenged the school teaching faculty and the students peer group in terms of providing an inclusive and supportive learning environment. Using the 'Framework for Inclusion' (Florian and Spratt, 2013) to develop questionnaires as a tool for interrogating inclusive practices and approaches to including all students in the school, current provision for this student was reviewed. In addition, how future plans can be developed to improve ways in which the school's ethos can become more inclusive for students who have a diagnosis of ASD or AS. Key concepts here include examining current beliefs on Inclusion, and inclusive practice.

LITERATURE REVIEW

Autism has been recognized as a condition among people working in the field of psychiatry for around 100 years. It was originally used by the psychiatrist Eugene Bleuler to describe the 'withdrawn' characteristics of young people he was working with whom he thought were schizophrenic. The term comes from a Greek word which means 'selfism' (The National Autistic Society 2013). Current figures tell us that around 25% of people with a diagnosis of ASD or AS are completely non-communicative (Feld, 2014).

Confusion about the terms Autism Spectrum Disorders (ASD) and Asperger's Syndrome (AS) stems from the work of two different psychiatrists, Leo Kanner, who was working in the USA, and Hans Asperger, who was working in Austria in the 1940's. Kanner noted that the 'fundamental disorder of the autistic individual is the limitation of their social relationships' (Stoddart, 2005, p14). He also applied the term 'autistic' to the young people who he was working with. There is no evidence to suggest that the two psychiatrists ever communicated with one another or were aware of each other's work. Some distinguish AS from ASD, noting that AS '...is characterized by individuals with, at minimum, normal intelligence and normal basic language skills' (Molloy, Vasil, 2004, p15).

Although debate continues around what are the defining characteristics of people who are diagnosed with AS, "Most researchers and clinicians... agree that... AS is part of the spectrum of autistic presentations, commonly known as Autistic Spectrum Disorders (ASD's)" (Stoddart, 2005, p15). Generally speaking, AS is associated with those who have the symptoms of what can also be called High Functioning Autism (HFA). John might therefore be described as having Asperger's Syndrome or High functioning autism.

Despite some apparent confusion in terminology, people who are diagnosed as having AS or ASD typically share 'Core Deficits'. In order for a deficit to be considered 'core' or

'primary' it must have several characteristics. It must be 'specific' (to autism), 'universal' (all people with autism must share the deficit), 'persistent', during the developmental process, and have 'precedence' (be the first thing to go wrong, which can be seen to be a primary cause leading to further 'deficit' effects later) (Schriebman, 2005).

The focus on these core deficits has been related to problems with cognition (particularly Theory of Mind (ToM), problems with feelings and emotions (and by connotation, problems with empathy (Glynn, 2013), or ability to read contextual cues (Schriebman, 2005), problems with attention and arousal, and problems with imitation.

Individuals with a diagnosis of ASD or AS are said to suffer from a 'Triad of Impairment'. These have to do with Theory of Mind, Weak Central Coherence ('part to whole', or a tendency to become absorbed by minute detail, and an inability to view the wider context of a situation (Attwood, 2007, p185)) and Executive Dysfunction (Organisation and Impulses), all of which have a negative effect on a person's ability to empathize with others and lead to problems with social interaction, communication and imagination (rigidity of thought) (Glynn 2013). Issues with social interaction for the individual on the Autism spectrum can mean that social demands can create anxiety (as quoted from John's Educational Psychologist Report, above), can lead to difficulties in reading body language or tone of voice, difficulties in maintaining friendships, and mean that the person can cause offence without being aware of it and present a generally egocentric world view (Attwood, 2007 p 127).

Issues with communication with the individual with HFA or AS can mean that they often use formal language or language that sometimes lacks expression, can have difficulties in reading tone of voice, taking things literally and a lack of understanding of implied meaning (Attwood, 2007, p127)

Rigidity of thought can lead to the individual with ASD having absorbing 'special interests', having an insistence on certain rules and routines and problems transferring one set of skills to another. (Glynn, 2013). As these characteristics or 'traits' of autistic individuals has become more widely known, more people have recognized themselves, or have been recognized to have ASD symptoms or those of AS.

This has led to what some professionals liken to an 'epidemic' situation of people recognizing the traits of autism in their children and in many cases, people much older who have always felt that they were somehow different, but were unsure why. Each new set of diagnostic statistics reflect this, suggesting that more and more people are being recognized as displaying characteristics associated with ASD or AS (Molloy, Vasil, 2004, p14). One set of figures suggest that 1 in 68 young people in the USA are on the autistic spectrum (Autism Speaks, 2004).

This supposed epidemic status has led to growing pressure to find a cause for ASD. In the 1960's it was commonly thought to be connected with 'cold womb' mothers and no treatment was offered or prescribed. Currently, it is thought to be caused by a mixture of genetic and social factors (Cohen, 2011).

The search for a cause has also been matched by a search for a cure. Current discourse suggests that there is no cure, but that ASD is a lifelong condition. Where early identification and intervention occurs however, young people with ASD can be taught many of the social skills that others absorb naturally (Humphrey and Parkinson, 2007). As was noted in John's Education Psychologists Report, his family reported some success with Applied Behavioural Analysis and Speech Therapy.

ASD OR AS AND INCLUSIVE PRACTICE AND PEDAGOGY

ASD or AS must always have existed, so that throughout history, people with ASD or AS have lived in an environment with little understanding of their condition or the challenges that they faced (Cohen, 2011). As diagnosis and awareness of ASD or AS increases, pressure on support service providers has increased accordingly (Newschaffer, Falb et al., 2005). To confuse the issue further AS, or Asperger's syndrome was removed from the Diagnostic and Statistical manual of Mental Disorders (DSMV, 2013) with ASD and AS now under a single diagnostic band, which can range from extremely low to extremely high IQ levels. However, Asperger's syndrome is still a useful shorthand in practice for those with high abilities not usually identified in autism.

A key challenge to implementing inclusive practices in education for young people with ASD or AS then, is the recognition that each person on the spectrum is an individual and thus there are no one set of practices that can be implemented in order to successfully include students with ASD in mainstream education. As Temple Grandin points out, 'The problem with autism is that you have a spectrum that goes from Einstein to someone who has no language' (Grandin, 2012).

Ayer's (2013) states that implementing effective inclusive practices in education is a 'journey' rather than a 'destination', in other words, an ongoing process which requires constant re-examination and re-evaluation as each student enters a school and the school's ethos adapts, so the student must also try to adapt to attempt to reach some point of equilibrium where he or she becomes as much as possible a 'normal' (for want of a better expression) member of the school community.

Ayers also distinguishes between a 'social' and a 'medical' approach to supporting students with additional support needs. The social model, focusing on the learning environment and how it can be adapted to accommodate individual needs is contrasted with the 'medical' model, which locates issues with adaptation to within the individual and being caused by their needs, requiring the support of external agencies, medicines

and staff. Ayers ultimately comes to the conclusion that the way forward lies somewhere in between for cases of severe additional support needs, which seems also to be the case in John and the school's journey towards inclusion. For example, his Educational Psychologist Report has been an invaluable point of reference for when things have not been going well with him. Similarly, on occasions where he neglects to take his medication and where the school have not been aware of this, his behaviour has appeared suddenly aggressive, without apparent cause leading him into situations where people have seriously questioned the appropriateness of his attending inclusive schooling.

Clements (2000) points out that: 'Making judgments about others' behaviour is not an objective, scientific diagnosis, it is a social judgement' (p32) he goes on to argue that where behaviour is judged to be problematic, that it is also important to examine the quality of the relationships around the individual and to consider whether this might influence the decisions being made (p34).

A key area of concern in including John in school life has been a lack of information sharing about his condition and its implications for his ability to form adequate relationships. For example, as noted above, John has an area of special interest with regards to Art and creating a fictional post-apocalyptic world. Moreover, as was also noted, his Educational Psychologist report points to high levels of anxiety. Konstantareas (writing in Stoddart, 2005) notes that where '...teachers are poorly aware of the Special Needs and characteristics of the child's behaviour... [an educational setting]... may be responsible for either triggering anxiety and depression or exacerbating these problems if they exist' (p55).

Attwood (2007) notes that the area of special interest in the person with ASD or AS can serve several functions. These include overcoming anxiety, a source of pleasure, an attempt to achieve coherence (and thus counter the characteristic 'weak central coherence typical of people with ASD or AS, understanding the physical world, the creation of an alternative world, the creation of a sense of identity, to occupy time, facilitate conversation and indicate intelligence (pp182 – 188). Two of these functions were examined in relationship to John's interest in art.

OVERCOMING ANXIETY

John often became more absorbed in his art work and writing when he was under stress for example, approaching exam dates, or where he was expected to take part in group activities such as sport, music or drama, or when something external threatened his sense of security. For example, Vietnam had experienced widespread anti-Chinese protests, leading to an older peer of John's speculating about the possibility of World War 3 approaching. At times like these he often used his 'time out' facility and could be found in the library or Art classroom furiously writing or drawing (Attwood, 2007, p182).

A SOURCE OF PLEASURE

The area of special interest can,

> *"...provide a means of personal validation and personal growth... result in genuine friendships, and can be a form of compensation to boost self- esteem, especially if the person has little success in the social and interpersonal aspects of life"* (Attwood, 2007, p184).

Although John had limited positive peer relationships, his art is a point of contact with some students (in particular John's 'buddy', a year 12 student, who made a point of checking in with him a couple of times a week to see how he was doing). He was always willing to talk at length about what he was working on, which could be a useful means of distraction from unpleasant things that happened in or outside school. Attwood states that where (as a clinician) he is having difficulty establishing rapport with someone with a diagnosis of ASD or AS, moving on to a discussion of an area of special interest can "visibly relax, showing enthusiasm, as well as delight" (Attwood, 2007, p190).

John obviously used his area of special interest to positive effect when he was experiencing anxiety at school. This pointed to a challenge however: if John's absorption in his area of special interest was so manifest in school, this suggested there were many aspects of John's school life which create anxiety. This meant he was spending more time absorbed in this interest than in following his time table. One teacher interviewed by Dixon (2004) noted that:

> *"for many complex reasons... what comes across to many young people is that they are not valued equally, that they do not count as much as those who are more successful in the terms defined by the school... 'they feel second class', and when that happens 'they become second class, it's a self-fulfilling prophecy'' (p176).*

When John had a 'Meltdown' (Lipsky et al., 2009), he stated in tears, that all he wanted was to be normal, and to be treated as normal, and that he has no friends. Working on these feelings forms the focus of this research and case study report.

METHOD

Participants

1) John's teachers and 2) John's peer group.

Teachers

A power point presentation (see appendix 1 for a summary) was developed and

delivered by the author for 10 minutes at a regular faculty meeting, followed by a question and answer session with several parents of students with a diagnosis of ASD or AS at the school. A survey questionnaire was designed which incorporated some aspects of the Framework for Inclusion as a tool to evaluate the extent to which inclusive practices and pedagogies were being enacted to support John's learning, and what impact, if any, this session had had on ideas about ASD or AS.

Teachers were invited to provide their names, so that they would have an opportunity to outline any area of concern for follow up.

21 teachers returned questionnaires, which were scored on a scale of 1-10 with 10 indicating highest score.

RESULTS AND FINDINGS

The results from the questionnaire showed that teachers felt more able to understand the needs of students with autism after the workshop. Those who had originally indicated very low levels of understanding had increased their knowledge ratings after participating in the discussion.
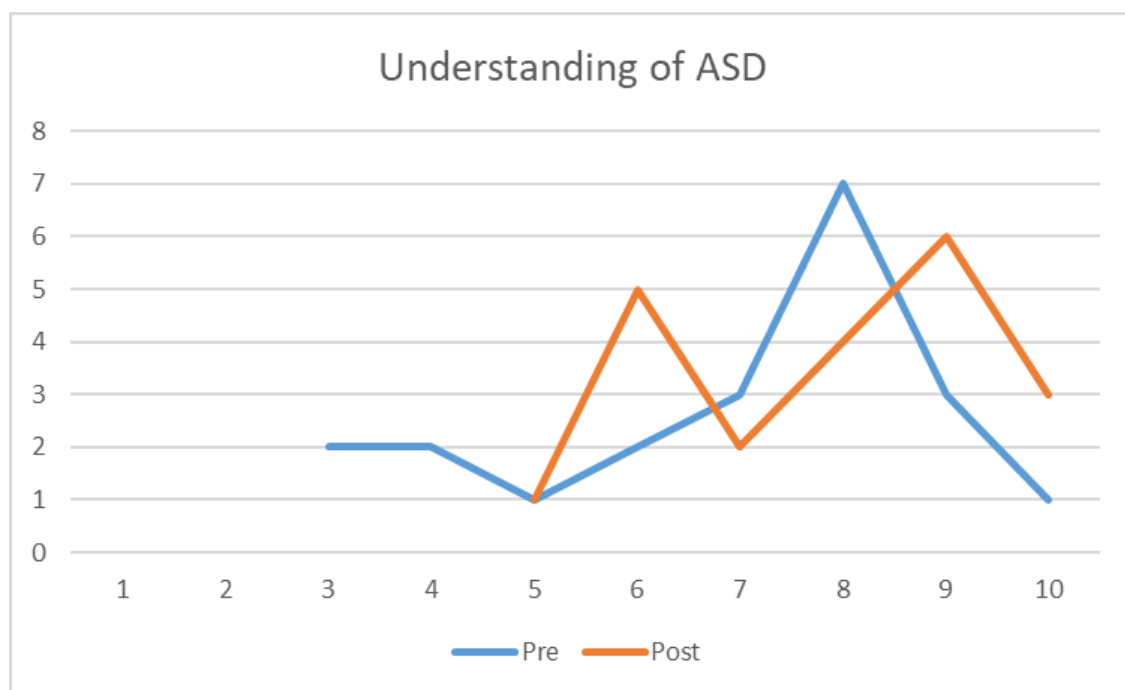

Figure 1. understanding and ability to include students with ASD pre and post discussion.

This suggests, quantitatively speaking, that the knowledge base regarding the needs of students with a diagnosis of ASD or AS among staff was marginally increased following the workshop/discussion. As the workshop/discussion only lasted around 40 minutes in total, it is not surprising that more striking gains were not evident. It was clear that staff had some measure of understanding prior to the discussion, but this had been enhanced and staff now felt more confident in including students with ASD or AS.

Additional optional comments addressed specific concerns that staff had with autistic students.

These included the following statements:

'Is it right for an autistic student to be doing International Baccalaureate (IB) classes?'

'No IEP provided to staff for autistic students'.

'Share IEP's with staff'.

'There needs to be a database on IEP needs to be released. There needs to be fortnightly/monthly meetings'

'As long as these students can be managed appropriately – for example one/two students per class so they don't distract teachers from other students. Balance of class needs to be distributed'.

'I would like to see more information about these students'.

'Yes [students receive adequate support via Learning Support Department] *however, I have never seen an IEP for either of my ASD students'.*

'Feel in Specialist Subjects some aspects need more Support than others'.

These comments point to a clear area of development for the author's own practice: namely the developing of and the sharing of information within clear and detailed IEP's.

Particularly illuminating is the point that there should be fortnightly or monthly meetings to discuss how effectively students are being supported and any issues that need to be addressed. This is an excellent idea which reflects the principles of what Sachs (2000) calls 'Activist Professionalism'.
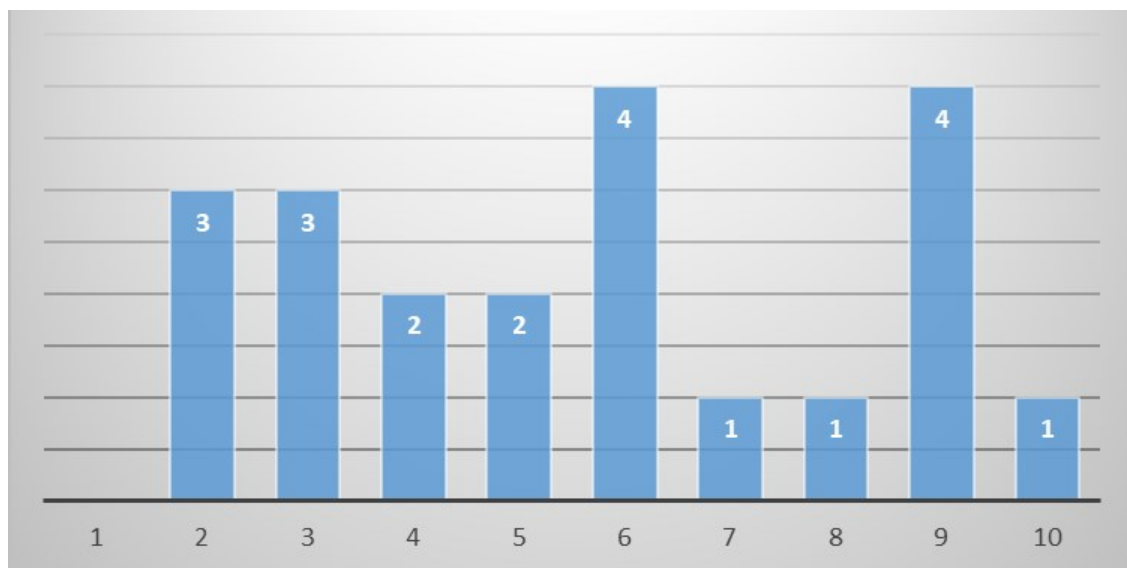
Figure 2. Response to on a scale of 1-10. "Do you believe that the school offers adequate support to staff and students in order to ensure that all students with a diagnosis of Autism/Asperger's Syndrome can make progress?"
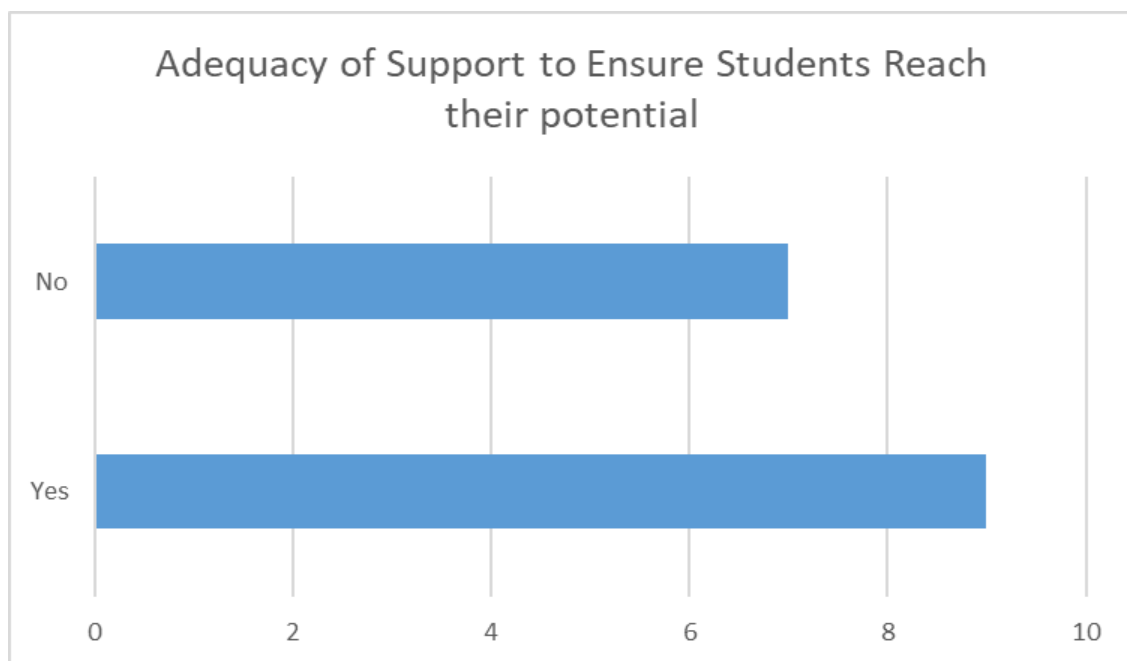

Figure 3. Response to "Do you feel sufficiently supported to ensure that all students who attend your classes can achieve their potential? (Y/N)"

Staff were also asked whether the support currently provided was adequate to ensure students reach their potential. It can be seen from the figure below, that results were mixed, with 7 of the staff noting that support was not yet adequate.

Staff were then asked to indicate from the list below, which resources would be useful to them in helping all students to achieve their potential, ranking them on a scale of 0-10. Staff were allowed to select as many resources as they wished from the list presented. These included more discussions, knowledge of individual background, added support and peer education. The resources suggested are grouped by colour, as indicated in the key, and the number of staff selecting each resource is indicated by the height of the bar on the chart. It can be seen from the graph below that further information on individuals with difficulties would be clearly the most effective, with 9 staff participants rating this very highly, and a further 4 rating this highly.
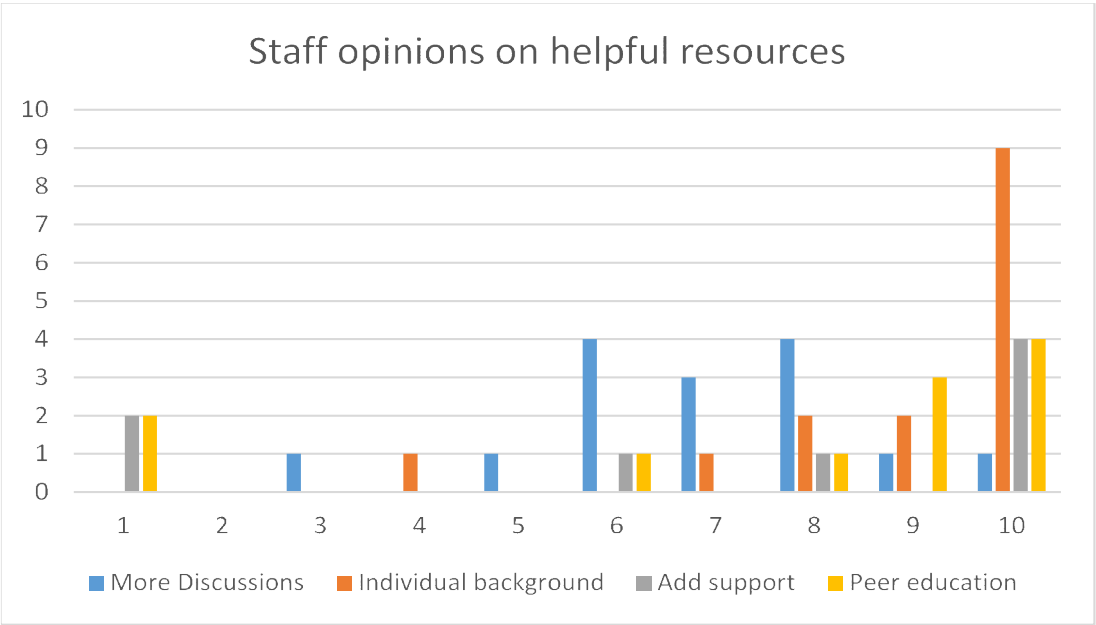
Figure 4. How effective would each of the resources be in ensuring all students meet their potential.

Again, the indications seem clearly to indicate that some staff do not feel sufficiently empowered to enact the principles of inclusive pedagogy due to a lack of information about individual students. However, this does not indicate that they are unwilling to try, given the appropriate information. On a personal, professional level, this again points to a clear area for development within the Support for Learning Department.

Interestingly, peer education does not seem to be a top priority among staff, by contrast with the (albeit limited) response from the students (discussed below).

Finally, staff were asked a general question, on attitudes to inclusion generally, with the majority supporting the concept of inclusion in terms of the progress of the class overall. Only 14 staff members answered this question. However, this may point to a problem with the design of the questionnaire. It was distributed on 2 sides of one sheet of paper. Several staff members left the back of the sheet completely blank, and some staff overlooked the other side.
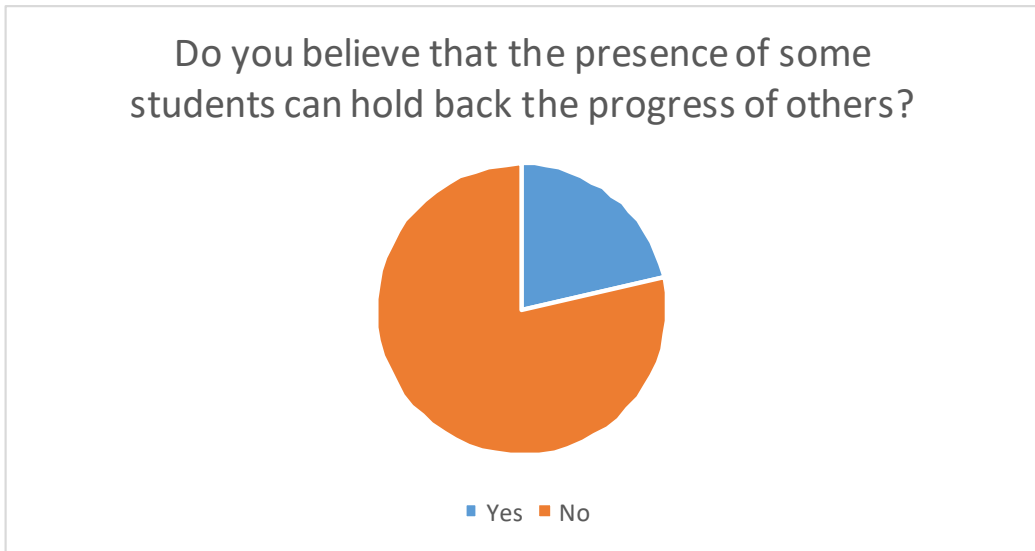
Figure 5. Does inclusion of special needs hold back progress for others

A number of interesting Additional optional comments were provided:

'Having Special Needs students in class enhances the learning of others in at least 2 important ways.
1) Everyone learns about the gifts/challenges of Special Needs Students,
2) Others can consolidate their learning and empathy by teaching Special Needs students'

'Yes, when proper support is not provided'

'Yes, because we do not have support'

'Can affect social dynamics of a class/group'

'Not if sufficient support in class and out of class is available'

While it is heartening to see that over 75% of respondents agree with this core belief embedded within the Framework of Inclusion, work obviously needs to be done in terms of providing support, information and discussion about how to include students without holding back the progress of others.

All teachers who responded (13) used formative assessment to support children's learning.

Grouping was undertaken based on ability (1 respondent) how learners support each other (5 respondents) with 3 respondents noting other criteria for grouping, including social interaction and academic capability.
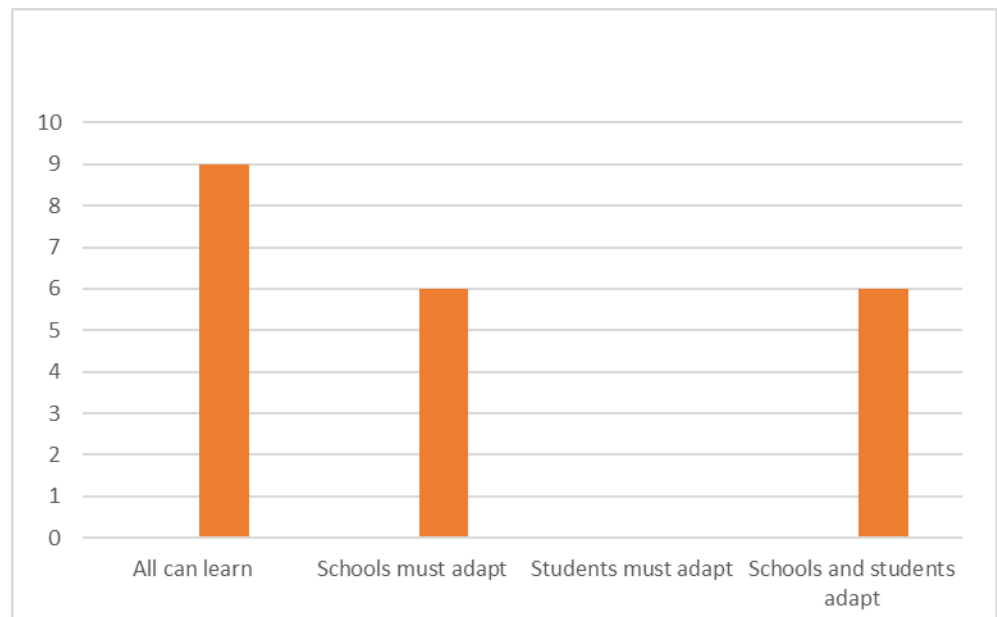
Figure 6. Staff understanding of principles of inclusion.

Additional comments included the following:

>*'Schools need to support and teach children inclusive behaviour'*

>*'Use different grouping at different times for different purposes'*

Responses from the peer group.

For John's peer group a lesson plan was designed based on The National Autistic Society (Scotland)'s Resource Pack for Schools, 2012, (pp. 27-35). This is also included in the appendices.

The first question asked them as a group was whether any of them had heard of ASD or AS. None of them had heard of either of the terms or the associated concepts.
The sample population was John's registration group. John's mother attended this session in order to give a more personal perspective than the more general discussion about ASD or AS.

Again, this was followed up by a questionnaire, designed to evaluate how much the students had learned about ASD or AS. In this case, the students were offered anonymity, to allow them to be open in their comments, because it would be unfair to put them under pressure to be accountable for any concerns that they may have wished to express. This might explain the poor response: only 3 students tackled the questionnaire.

PRESENTATION OF RESULTS/FINDINGS

After the presentation, 2 out of 3 students who responded knew more than previously about ASD/AS, all agreed that it would have been helpful to have the discussion earlier in the year, and that the school should participate in Autism awareness week in April. All agreed that in future all students in the class should be made aware of any new students staring with ASD/AS.
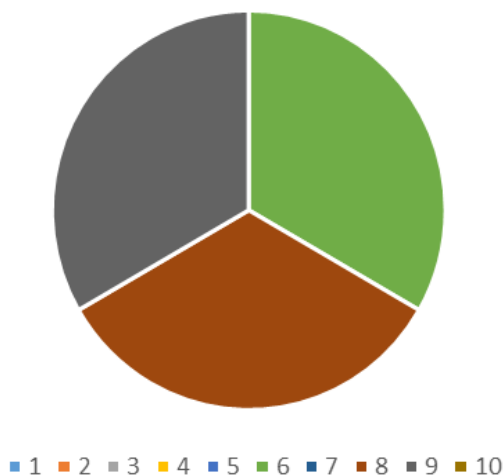
Figure 7. Suggestions from students on awareness.

Information during lessons

■ 1 ■ 2 ■ 3 ■ 4 ■ 5 ■ 6 ■ 7 ■ 8 ■ 9 ■ 10
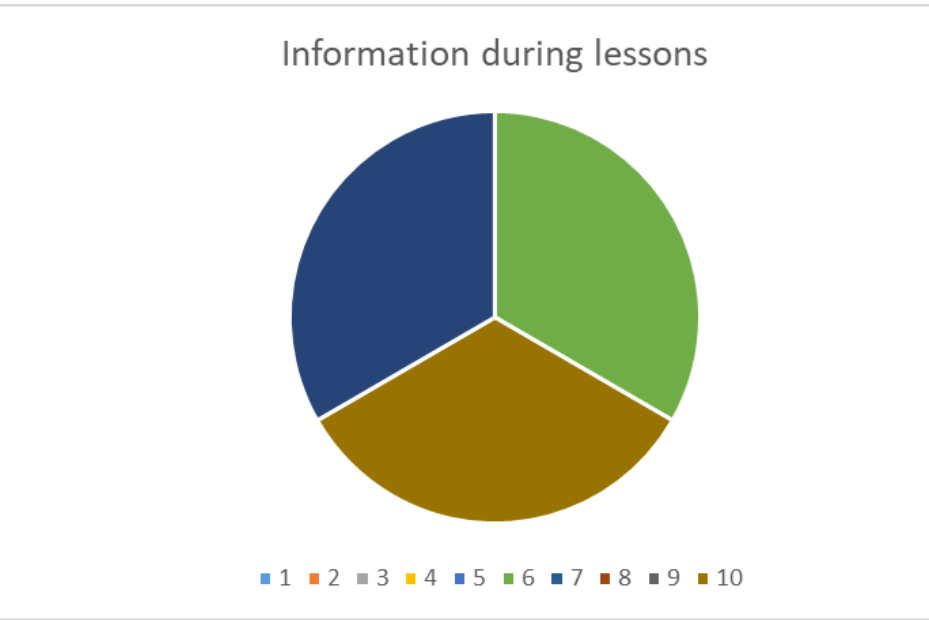
Figure 8. Usefulness of information during lessons

From the figures above, it may be seen that the strongest response was to the suggestion of information being provided in lessons. This would be very immediate and could be useful in dealing with day to day incidents.

Students were encouraged to suggest one thing that you can do to help people with autism enjoy coming to school.

'being more friendly with them'

Although it is disappointing that only 3 students chose to fill in the form, some positive conclusions can be drawn from these results. The most obvious one is implied in the one response quoted above. Even if only one student can look beyond the manifestations of John's ASD/ AS in his behaviour and make even a small effort to be politely friendly with him, this will be beneficial to him.

Also, all three felt that the discussion would have been more useful if it had been held earlier in the year, which confirms that the approach has been useful. Moreover, they all responded positively to the idea of celebrating 'Autism Awareness Month' next April, which is something that is planned for future organisation. Varied responses on how it should be celebrated would be considered in the future.

CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS

Following this intervention to improve staff and student understanding of autism, it became clear that although staff had some concepts in relation to this condition, they continued to need further knowledge with a number of significant implications to inform future practice. The results indicated that a third of the staff felt that they could not support autism adequately. These results are in line with the findings in the literature, suggesting that although there is a recognition of the need for full inclusion, this is harder to obtain in practice despite good intentions on all sides (Bartonek et al., 2018, Pellicano et al., 2018, Florian and Spratt, 2013).

First, there is an ongoing challenge in the lack of understanding about ASD and AS in this school. A missed opportunity was 'Autism Awareness Month' which is celebrated in the United States in April. A whole school approach involving assemblies, role play and questionnaires would be appropriate for the future.

Also, earlier action may be needed when a student with additional support needs has difficulty settling in to school and they are presenting behaviour that their peers find challenging. Obviously, each case needs to be considered on its own merits, but the feedback from John's peers indicates that an open discussion of the type held would have been more useful earlier in the year. This is definitely something that will be considered in the future if faced with a similar situation.

Thinking more critically about practice and performance in relation to the Framework for Inclusion, work obviously needed to be done to develop meaningful and useful IEP's and ensuring that all teachers have access to these.

Future plans include holding review meetings and updating IEP's before putting them in a shared folder where staff can access them, and asking the Head of Secondary to have time slots to outline their content during staff faculty meetings.

Moreover, a proactive approach would be more constructive when considering the admission of such students in the future. In other words, class teachers should be given advance warning about the nature of a new student's needs so that they can be prepared for the impact on their classes and they can consider, discuss and consult on which pedagogical approaches may or may not be appropriate for this student.

Similarly, where a student has obvious social difficulties, his or her peer group should be consulted too. However, this is not a clear-cut issue, and the ethical implications of this in terms of data protection would need to be considered. Of course, this cannot happen without the full consent of the student's parents and generally speaking, the student should be consulted too, as John was here. These ethical implications would be a valid

area for further research. Another area for further research would be on ways to work with the student on how his behaviour can appear to others and how this can be modified by focusing on learning social skills. A key area of further research would be to follow-up on this case study and any impact it has had on John's future well-being.

There are a number of limitations in this study which should be addressed in further research. A preliminary questionnaire could have been developed to assess knowledge at the start of the study, material presented could have been followed up with further sessions, and the questionnaire could have been more complex in design. Nevertheless, the study has produced some useful pointers which could be used elsewhere to the integration of students with a range of difficulties.

In conclusion, this study forms a useful starting point in ensuring the fuller inclusion of students with AS, in terms of the need for greater awareness for both staff and peer groups of the condition and associated difficulties. A similar approach could usefully be employed in schools internationally, with informed consent.

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APPENDIX

Follow up questionnaire given to staff:

Rating Scale - 0=lowest, 10=highest

Previous to the workshop/discussion rate how well you felt you understood the needs of students with a diagnosis of Autism/Asperger's Syndrome:

Please circle one:

0	1	2	3	4	5	6	7	8	9	10

Do you feel in a better position to include students with a diagnosis of Autism/Asperger's syndrome following the discussion?

Please circle one:

0	1	2	3	4	5	6	7	8	9	10

Do you believe that the school offers adequate support to staff and students in order to ensure that all students with a diagnosis of Autism/Asperger's Syndrome can make progress?

Please circle one:

0	1	2	3	4	5	6	7	8	9	10

Additional comments (optional):

Do you feel that conditions in school can be changed to make sure that all students with a diagnosis of Autism/Asperger's Syndrome can make better progress? (Y/N)

Do you feel sufficiently supported to ensure that all students who attend your classes can achieve their potential? (Y/N)

If no, please rate on a scale of 0 to 10 what type of resources would help to achieve this (circle one for each suggested resource):

More discussions of the type that took place on at the workshop/discussion

0	1	2	3	4	5	6	7	8	9	10

More background information regarding individual students with a diagnosis of Autism/ Asperger's Syndrome

0	1	2	3	4	5	6	7	8	9	10

Additional support in class (support staff)

0	1	2	3	4	5	6	7	8	9	10

Peer education (students take part in a discussion/workshop similar to the one you attended.

0	1	2	3	4	5	6	7	8	9	10

Other (please specify):

INCLUSION (GENERAL)

Do you think that the presence of some students (for example, those with a record of additional support needs) can hold back the progress of others? (Y/N)

Additional comments (optional):

Do you use formative assessment to support children's learning? (Y/N)

Do you group children according to (please circle one):

What they can achieve (ability).

How learners can support one another.

Other (specify below if you like):

Which of the following statements more clearly matches your understanding of the principles of inclusion in education?

☐   *All children can learn.*
☐   *Schools should adapt to the needs of students.*
☐   *Students should adapt to the requirements of the school.*
☐   *A combination of all three statements above.*
☐   *Other (please specify)*

PEER EDUCATION LESSON OUTLINE/AUTISM

Quick brainstorm: What are social skills?   - Mind Map
Teacher elicits: the ability to make and maintain positive relationships/friendships.

What is a disability?   (Elicit examples?)

Teacher defines: It means that you are unable to do certain things because of circumstances you cannot control.

How should people with a disability be treated?

Teacher elicits: We should respect and help them where we can.

Teacher:
- Asperger's syndrome or autism is a disability.
- People with this condition have problems with learning social skills.

The reason for this is that people with this particular disability have problems learning certain things that you have all learned easily when you were younger.

Examples:
- Not saying rude things
- Being able to make friends
- Listening politely when you are not really interested in something
- Being able to take part in games with other people
- Being able to understand how other people might feel/how what you say to them might make them feel (this is called 'empathy')
- Understanding jokes
- Being able to adjust to changes that you have not made yourself (eg, having to change school)
- Controlling your body language

Understanding how to not take things personally (examples?)

- *Some people with autism never learn to talk*
- *Others, like John, are very intelligent in some ways, but have problems learning the types of skills we have mentioned above.*
- *We understand that sometimes it can appear that John reacts to things that people say to him in a way that you may not expect.*
- *We also understand that he may say things that you would not expect, and perhaps find to be rude.*

- *We hope that you understand that although John tries very hard to learn the 'Social Skills' that we have talked about, that it is very difficult for him to do this, and probably always will be.*
- *This does not mean that he does not want to be your friend. He very much does. It is just that he does not understand how to make that happen.*
- *How can we make that happen (not just students, but staff and John himself)?*

Question for discussion/X to take over:

STUDENT QUESTIONNAIRE (FOLLOW UP FROM PEER EDUCATIONS SESSION

Do you feel that you know more about autism and Asperger's Syndrome now than you did before Friday's discussion?

Yes / No   (Please circle one)

Do you think that it would have been helpful to have this discussion earlier in the year?

Yes / No   (Please circle one)

April was Autism Awareness Month. Do you think that the school should do more to celebrate Autism Awareness Month?

Yes / No   (Please circle one)

If you answered yes, please rate on a scale of 0 (not helpful) to 10 (very helpful) how helpful you think the following things would be:

A whole school assembly

0	1	2	3	4	5	6	7	8	9	10

Information about autism being given to the students (for example during lesson time)

0	1	2	3	4	5	6	7	8	9	10

Posters about autism and autism awareness

0	1	2	3	4	5	6	7	8	9	10

If a new student with autism is admitted to the school, do you think the other students in his new class should be made aware of what autism is?

Yes / No   (Please circle one)

(Optional)

If you like, please write down one thing you think that you can do to help people with autism enjoy coming to school.

(Optional)

Please write down any suggestions that you may have for the school to support people with autism

Discrepancies between support provided and accessed in UK for disabled students

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Abstract

The aim of this research was to identify the uptake of Disabled Student Allowance (DSA) allocated support by disabled students within a higher educational institution, solely within the Art & Design faculty in the UK. Specifically, the study intended to ascertain what support roles in particular were not being taken up by students and possible barriers or explanations as to why this is. The study gathered quantitative statistical data as to the number of hours taken up and within what particular role. Qualitative data was gained to further investigate the uptake levels through the use of online questionnaires. The in-depth case study allowed for data to be gathered within a narrow field and for recommendations to be made. Results show that significant barriers remain for students with disabilities within university, and the system set up to reduce this gap, may very well be part of the problem, alongside other factors such at the university department organising the provision.

Several recommendations such as the necessity for a review of the current processes, particularly the Needs Assessment procedure is required, alongside institutional based improvements. Further investigation is required into the discrepancies between support provision and uptake identified by this research. Implications for establishing a support system in regions where none is yet available is also considered, but again required further attention.

Keywords: Disabled Students Allowance, Support Provision, Barriers to Support, Assistive Technology, Equality

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INTRODUCTION

This aim of this research was to investigate the discrepancy between the support hours allocated through the UK Disabled Students Allowance and the uptake of this support by disabled students. The study intended to identify possible internal and external causes for the lack of uptake and recommend departmental changes to address this. Disabled individuals within this report are students who meet the 2010 Equality Act definition of disabled in that they "have a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities" (Equality Act, 2010). These students have been diagnosed with a disability and have proceeded to complete a Needs Assessment and apply for support through the Disability Students Allowance.

Prior to gathering data, a number of hypothesis were made. The main hypothesis was that across all support roles there would be a lack of uptake by students, while no theories were set as to the reason for this, it was expected that the data would show a strong correlation between lack of uptake and support. With the rise of technology, the second hypothesis lay around the increase of allocation and uptake of Assistive Technology Training rather than the more traditional Note Taking support. Working in the field for a number of years, the last hypothesis was based around previous experience and the expectation was that the most commonly allocated support role was Specialist 1:1 Study Skill support, followed by Assistive Technology Training and Study Assistance. It was predicted that the data gathered as part of this study would support these initial hypothesises.

Issues around disability in Higher Education have proved contentious since its initial implementation 25 years ago. While there is an increasing need for additional support, with growing disabled student numbers annually, this support is taken up by only 25% of those registered as disabled. The reasons for this lack of uptake remains unclear with some critics arguing that inclusivity and support for students remains a "combination of tick-box approaches to achieving disability equality, failures by some universities to implement legally required measures, and failures by the student's loans company are all hindering disabled students" (Hirsch and Lagnado, 2010). The process of accessing the Disabled Students Allowance can itself be a major deterrent for students with disabilities, involving a number of complex stages over the first two terms of university in many cases. The process is outlined in Figure 1 on the following page.

There is no deficit in the number of policies or initiatives which focus upon disabled students in the UK, yet arguably there is very little research which takes into consideration the first-hand accounts and experiences of those who are at the heart of the issue- the students themselves. A notable exception was a 2009 report from the Centre for Disability studies, drawn from 96 Higher education institutions in England and Wales, whose research explore the beliefs of both staff working in HE institutions and the

Induction and Pre-Assessment
- The first week for students within university is induction week. During this week they will receive a talk from student services in that school, who will provide an overview of the services offered an how to pursue support.
- Screenings are offered on a weekly basis throughout the academic year. These screening consist of a dictation exercise which highlights possible challenges.
- Following the dictation exercise, students will be sent a pre-assessment questionnaire. This questionnaire goes into increased depth about challenges the student may experience, this will provide indicators of a range of disabilities including dyslexia, dyspraxia, ADHD and Autism.

Screening
- Following the completion of the pre-assessment questionnaire, it is possible to identify the key areas in which the student shows indicators.
- A member of the core team will then perform a screening. A screening will vary dependent upon the indicators, some are simple questionnaires while others are assessments such as the DAST.
- After the completion of the screening, a short report will be created detailing the key findings. This along with the testing scoring sheets is sent to the administrator for student service es to be sent forward to a full Diagnostic Report.
- This university offers Diagnostic Bursaries to cover the cost of reports for students.

Diagnostic Assessment
- Following the approval of the Diagnostic Bursary, a diagnostic report will be organised within the university. This could be completed by a professional qualified to complete diagnostic assessments or an educational psychologist, depending upon the indicators presented within the pre assessment and screening.
- Once the Diagnostic report has been completed, and approved by the student, this along with an application for DSA will be sent off for approval.

Needs Assessment
- Once DSA has approved the Diagnostic Assessment they send a letter directly to the student, asking them to make an appointment for a Needs Assessment.
- A Needs Assessor will look at the students Diagnostic report and make recommendations based on their individual needs. These recommendations could include non-medical helper support, assistive technology or financial support with printing or travel costs.
- A completed Needs Assessment is sent to the student for approval, before being sent on to DSA.

DSA 2
- The final stage of the process, in terms of student finance and DSA. Once DSA have accepted the Needs Assessment, a letter called a DSA 2 is sent to the student. This letter sets out what support is provided to the student and which provider will be giving them the support, fore example, if it is a university or if it is an external company.
- Once the student has the DSA 2, they provide a copy of the letter to the provider with equipment, they would need to contact the provider directly and arrange for delivery of this.

Figure 1. Flow chart showing the process of applying and receiving DSA support at a UK Higher education institution.

students. This report entitled *Evaluation of Provision and Support for Disabled Students In Higher Education* investigated in significant depth the support provision in place for disabled students through the use of a national survey. This study found that there was a substantial need to respond more rapidly to the requirements and needs of those students whose impairments were not visible, specifically this related to improving teaching and assessments, as well as the assessment of individual needs. Key findings from this report identified that while the thinking around disability has certainly gained attention over the last 10 years, and arguably there has been a change in attitude visible within intuitions , this does not equate to appropriate responses to such needs and commonly these needs, although noted, are not at the top of agenda. These issues and the lack of corresponding studies to corroborate provided the rationale for this piece of research.

ETHICS

Full ethics permission was granted by the University ethics committee, with fully informed consent, anonymity and right to withdraw.

METHODOLOGY

A mixed methodology approach was adopted using both qualitative and quantitative research methods, based on a questionnaire including both open and closed questions. These questions investigated the type of support students were allocated, what they were accessing, why they were not accessing support if this was the case, levels of satisfaction of the process leading up to support as well as the support provision itself, and finally if students had suggestions as to the improvement the system or service. The questionnaire consisted of 23 questions (see Appendix 1) using a combination of open and closed questions to gain qualitative and quantitative data. Initial questions were based around what support they had been allocated and which support they had picked up, with follow up questions asking why they perhaps chose not to pick up support, or if there was support not allocated to them that they would have benefited from. Follow on questions were based around overall thoughts and feelings towards the support service they accessed, allowing them to share opinions on how the service could have been improved or how appropriate they felt the environment was to their learning. The last set of questions enabled the student to opt into the second stage of the research - an interview, as well as request a meeting with Student Services to discuss their support needs following this questionnaire. No questions around the participant's age, gender or course were asked as at this time these were not relevant to the study.

Participants

A convenience sample of 198 students participated who held a diagnosis and Disabled Students Allowance, including students with Dyslexia, Attention Deficit Hyperactivity

Disorder (ADHD), Attention Deficit Disorder (ADD), Autism and mental health issues, and co-morbidity between these disabilities.

RESULTS

Unfortunately, due to moving university and therefore, loosing access to the participants for this study, results were manly compiled from the online questionnaire and statistical data, with only one interview having taken place. Across all roles, a large percentage of support hours allocated were unclaimed by students. The significant lack of uptake raises concerns, and requires further investigation. The support type most frequently allocated to students was Specialist 1:1 Study Skills support, with 86 % of students being allocated this type of support, corroborating the initial hypothesis and therefore, forming itself as the focus of analysis in that it addressed the majority of students. While three students used above their allocated hours and requested additional hours through the Needs Assessor and consequently the funding body, less than 5% of students used the total hours allocated to them. 30% of the students within this study used less than 50% of their hours, with 40% having never accessed any of the support allocated to them.

The second most common support type allocated to students was Assistive Technology Training (ATT), with 62% being awarded with support hours. Historically, students would have been allocated Manual Note Takers to support them with lectures, however, a change in provisions sees the reduction of this. Data from this study shows that only 3% of students were allocated a manual note taker in 2018/19 and of these hours none were used. This data is consistent with the initial hypothesis that as technology develops and becomes improves accessibility and access, there will be a concurring increase in the number of Assistive Technology Training hours allocated, and consequently a decrease in the demand for Manual Note Takers.

When asked in the questionnaire if students used all of the allocated support provided to them, 64% responded yes. However, statistical data from departmental records show that 56.5% of all support allocated was not taken up by students, which means that a mere 43.5% of support was used; a 20.5% discrepancy [Adding up all of the percentages of hours used and dividing by the roles to provide an average percentage of all support used].

While the departmental statistical data starts to show a picture of the current climate of DSA support provision, it was the qualitative data which provided valuable insight into this. There were two reoccurring themes which arose when students were asked why they did not take up their support. The most common response from students was that they felt the support allocated to them did not meet their needs, with 43% commenting it was not the right support for them. The second theme was that students were unable to access the support, either because no one replied to their correspondences or there were no staff available at the time and they were put on a waiting list. One student

commented that the entire process of getting and arranging support was simply too complicated, and therefore, support was never taken up. 29% found that despite having followed the entire process to accessing Disabled Student Allowance when it came to arrange this support with the university, they were unable to. One student commented that "I tried to book them in but was never contacted to arrange it" (Anon Student, 2018), while another said that support was "too hard to get hold off" (Anon Student, 2018). These comments highlight the need for further investigation and analysis of support provision for students in higher education, particularly within this university.

More detailed information was obtained from the interview study, with one insightful student commenting in depth on the shortcomings of the existing system, in particular the Needs assessment, which forms the basis of the support offered (see Figure 1 above for an outline of the process).

> "the initial interview to determine support, while thorough, couldn't foresee how I would handle techniques and processes that hadn't been tried prior to university. I feel it would be beneficial to have a follow up interview after the first term to adapt/increase/decrease the level of support offered after the student has had a chance to identify areas they need additional support. Also, as you have to book in support usually a week in advance, this does not allow for lecturers who don't let you know a week in advance what workshops they have planned or any spontaneous workshops, resulting in students having to sit out of workshops that require participation"

(Anon Student, 2018).

DISCUSSION

The initial hypothesis contended that across all support roles there would be a lack of uptake, this was proven indeed to be the case. Research arguing just this is not uncommon; Macculaugh, Basanquet and Badcosk (2016), reported that 70% of students did not pick up their recommended support, similarly Wilkinson, Draffan and Viney (2012) report that 60.6% of students failed to pick up support allocated to them. The reason for lack of uptake is not clear, with both qualitative data gathered from this study and others providing a myriad of reasons with no obvious consensus. Two main themes appeared as a result of this study in relation to why students are not taking up support. Students are most frequently attributing lack of uptake to incompatibility of support allocated, closely followed by the inability to access the right support when needed.

There is no doubt that the majority of students are not picking up their allocated support, the reasons for this is a significantly more complex issue. When asked why support was not taken, 43% of students said they did not feel the support allocated met their needs. This is not a new insight, with 7.4% of students in Wilkinson, Draffan and Viney's 2012 study saying mirroring comments. As part of the Disabled Students Allowance process

students undertake a rigorous diagnostic assessment, followed by an in-depth Needs Assessment which discussed the needs of the student. Despite this long, sometimes tedious process, feedback from students remains consistent that the support allocated does not meet their needs. This highlights an area in desperate need for further investigation. Student feedback is saturated with comments that the support provided does not meet their needs, yet as this study has shown, a large percentage have never accessed any support but remain determined it is not right for them.

The *Evaluation of Provision and Support for Disabled Students in Higher Education* report (Harrison et al., 2009) attribute this to the unrecognised and unmet needs of students, and that despite good practice, there are significant gaps in support provision which students can fall through. Perhaps this this is based on a miscommunication of the reality of support against student expectation, or lack of communication at all as to what support can offer.

The inability to access the support provided was the second most common comment made when students were asked why they did not pick up the support allocated. The details of this are not clear and would require an in-depth departmental investigation to find where the service needs to be improved to meet the student's needs. Unfortunately, this seems to be the case for many institutions who are aware of the requirements of disabled students and are making steps to address these, but this does equate to successful delivery. Harrison et al., (2009) found in their research that there was evidence of delays for student attempting to access support, poor awareness and understanding of disabilities and process by staff, shortfall in resources and facilities, and lack of continuity across many institutions working with disabled students.

The quantitative data corresponds with the initial hypothesis of this study which foresaw the increase in Assistive Technology Training provisions in replacement of Manual Note taker. Following cut backs in Disabled Students Allowance, and the development of digital technology, the majority of students are no longer allocated a Manual Note Taker (McLean, 2017), rather they are provided with software which records and transcribes their notes. Feedback from student demonstrated that they were not happy about this shift in support provision, and argued that a Manual Note Taker would be more beneficial: "I would have liked to have a note taker, as lectures can often get quite disorientating" (Anon student, 2018). Maccullagh, Basonquet and Badcock (2016), correspondingly found in their research that students expressed issues and frustration with Assistive Technology in that it had a tendency on occasion to not work, and that a Manual Note Taker would meet their individual needs a lot better than a piece of software created to meet the needs of the many. They found that students with dyslexia reported the process of taking notes to be extremely difficult, and that use of Assistive Technology required too many hours of additional tutoring and familiarisation with the software. Arguably, a Manual Note Taker requires no additional effort on the student's part in many instances. Despite research and student feedback arguing that students

are in need of Manual Note Takers, statistical data from this study shows that of those students who were lucky enough to get that support allocated to them, a mere 3% of students, none of the support was actually picked up. This discrepancy requires further investigation, the misconnect between student feedback and statistics suggests that there is a need for Manual Note Takers, but that perhaps the support provision is not being focused when it is needed.

While this study found a very small proportion of students are being allocated Manual Note Takers, the number of students being given Assistive Technology Training was as expected significantly larger, with 62% of students being given four or more hours of training as part of their Disabled Students Allowance support package. Despite technological advancements and academics arguing that digital technology and consequently Assistive Technology Training will increase, the number of hours of support picked up by students is lacking, with the majority choosing not to access this support. The reasoning for this is not clear with student comments following general themes of inconsistent practice of support services rather than specific feedback regarding why they did not pick up their assistive technology package. This is an element which requires further in-depth investigation in light of the allocation of Assistive Technology in replacement of traditional Manual Note Taking. If this does indeed become the case, it is important to identify what the barriers are affecting the student's ability or willingness to access such support, and subsequently recommendations can be made for improved practice.

RECOMMENDATIONS

As this is a case study of one particular faculty within a higher education setting it is not possible to make conclusive recommendations, but rather form institution-based ones alongside noting themes which require further investigation. Internally, the systems and processes in place for the department need to be revisited and revised to ensure they are fit for purpose, meet the students needs and are accessible when required. More time and resources being allocated at the early stages of support provision have the potential to address any misconceptions or issues at the beginning of the process which consequently would reduce challenges down the line. As part of this early intervention process, expectations of support must be addressed from the outset, with clear guidelines set out as to what the role and purpose of this support is. While there was evidence of good practice in the case of staff providing this information to students from the initial stages of support, there lacks consistency across the department.

This study has provided valuable insight and highlighted issues requiring further investigation. It is not without its limitations however, while the statistical data was from the department as a whole, the qualitative feedback only provided an insight into those students who were registered with the department and were actively using one or more elements of the support provided. It would have been advantageous to have the

opportunity to speak to those who are not engaging with support to find out why. This study has only touched upon the surface of these issues and required a far more in-depth investigation. To expand upon the research here using a larger sample study, across courses and between different universities, would enable the data gathered here to be reinforced further with a larger qualitative and quantitate study.

Nevertheless, the findings of this study have clear implications for development more widely in regions where a system for supporting students has not yet been developed, and should provide a range of insights into improving on the existing system for application in other countries. This should enable the most effective and cost-effective approach to be generated, emphasising the need for ongoing monitoring of support, and the need to ensure that assistive technology and human support is based on expertise and ongoing evaluation.

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APPENDIX 1. ONLINE QUESTIONNAIRE QUESTIONS

Art & Design Student Services Support

The purpose of this study is to gain feedback about any support allocated to you by Disabled Students Allowance (DSA) from Student Finance England (SFE) or Wales (SFW). Specifically, I am looking into; what support you did pick up, what your experience of this was, and what support, if any, you did not pick up, and why this was the case. The results from this study will feed into departmental changes in student services within the university. All data gathered is confidential, and you can withdraw from this research at any time. This research comes in two parts: a questionnaire and an interview. At the end of this questionnaire, you have the opportunity to volunteer to be contacted for an interview. You also have the opportunity to request a summary of the research once completed.   Any questions or concerns please contact Kristina Addis.

Thank you for your time.

1.   Having read the information above, do you agree to take part in the study? Single choice

○   Yes   ○   No

2. At what point was your disability first identified? Single choice

○   Childhood   ○   School   ○   Secondary School

○   College   ○   University

3. How was your disability identified at university? Single choice

○   Induction   ○   Lecturer recommendation to see student services

○   Own contact with student services   ○   Other [   ]

4. How did you hear about the support you could access through DSA and Student Services? Single choice

○   University Induction   ○   Prior to university, through college or school

○   Lecturer   ○   Friend or classmate   ○   University Screening

○   Other [   ]

5. What Support has been allocated to you? (Please Select all that apply)
Multiple choice

☐ Specialist 1:1 Support   ☐ Study Assistant

☐ Specialist Support Mentor- Autism   ☐ Specialist Support Mentor- Mental Health

☐ Note Taker   ☐ Assistive Technology Trainer

☐ Communication/ Interpreter   ☐ Other [＿＿＿＿＿]

6. Are you in receipt of Disabled Students allowance? Single choice

○ Yes   ○ No

7. Do you use all of the support allocated to you? Single choice

○ Yes   ○ No

8. Which of your allocated support did you NOT use? Multiple choice

☐ Specialist 1:1 Support   ☐ Study Assistant

☐ Specialist Support Mentor- Autism   ☐ Specialist Support Mentor- Mental Health

☐ Note Taker   ☐ Assistive Technology Trainer

☐ Communication/ Interpreter   ☐ Other [＿＿＿＿＿]

9. Why did you not use this support? Multi-line Text

[Enter your answer]

10. Which support type have you found the most beneficial? Multiple choice

☐ Specialist 1:1 Support   ☐ Study Assistant

☐ Specialist Support Mentor- Autism   ☐ Specialist Support Mentor- Mental Health

☐ Note Taker   ☐ Assistive Technology Trainer

☐ Communication/ Interpreter   ☐ Other [＿＿＿＿＿]

11. Why did you find this support most beneficial? Single-line text

[   ]

12. Was there any support that you would have liked to access but were not able to? Single choice

○ Yes   ○ No

13. Which support type you would have liked but were not allocated? (Please select all that apply) Multiple choice

☐ Specialist 1:1 Support   ☐ Study Assistant

☐ Specialist Support Mentor- Autism   ☐ Specialist Support Mentor- Mental Health

☐ Note Taker   ☐ Assistive Technology Trainer

☐ Communication/ Interpreter   ☐ Other   [   ]

14. Did you access any additional support not provided through Disabled Students Allowance? Single choice

○ Counselling   ○ SoCom

○ Study Skills   ○ PASS

○ Other   [   ]

15. How challenging did you find the process of getting support?
   Rating: (1 being very easy and 10 being extremely difficult)

○ 1   ○ 2   ○ 3   ○ 4   ○ 5   ○ 6   ○ 7   ○ 8   ○ 9   ○ 10

16. In your opinion, what have been the benefits of support? Single-line text

[   ]

17. Are there any changes which could be made to improve your support? Single-line text

[ ]

18. Do you have any comments in regards to the facilities used for your support? e.g. rooms or equipment Single-line text

[ ]

19. Do you have any additional comments to make? Single-line text

[ ]

20. Would you like to take part in the second part of this research? This would involve an interview to discuss your views of support. Single choice

○ Yes   ○ No

21. Please provide your email address should you wish to take part in the interview Single-line text

[ ]

22. Are there any other comments you would like to make, to be shared or passed along to student services? Other comments or feedback given before this point remain confidential. Single-line text

[ ]

23.If you would like a summary of the research following this, please add your email address below. Single-line text

[ ]

Learning articulation, language and literacy (ALL) through echo poems for young children

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Abstract

The purpose of this paper is to introduce the concept of echo poems, and how they can be used to help young children learn ALL - articulation, language and literacy. The concept of each term, articulation, language and literacy is elaborated, and with that, suggestions on how echo poems can be used for the teaching of the respective conceptual area. To help educators to better support children in their learning, some of the challenges that young children may have in these conceptual areas are discussed. In this way, it is hoped that children can become more motivated to learn and have better outcomes in the learning of articulation, language and literacy.

Keywords: Echo poems, young children, difficulties in articulation, language, and literacy.

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Research (e.g. Bryant, Bradley, Maclean, & Crossland, 1989; Goswami, 1999) has established that in learning to read, interventions targeting rhyming have significant impact on improving the reading skills of children who had difficulty in rhyming. This has confirmed the key significance of rhyming in phonological awareness and learning to read. However, nursery rhymes are often overlooked as an effective vehicle for learning in this digital age. According to the National Institute of Child Health and Human Development (2000) National Reading Panel (NRP) report, there are five essential components of reading instruction - Phonemic awareness, Phonics, Vocabulary, Fluency, and Comprehension.

This article on learning articulation, language and literacy (ALL) relates to these five components from the NRP's report on teaching children to read. The report provides the evidence-based assessment of the scientific literature on reading and its implications for reading instruction. The use of the essential components in learning ALL would therefore find its underpinning in the implications for teaching from the report.

ECHO POEMS

Many educators know that young children enjoy the sound of rhymes, so using poems with rhymes in them can make the job of teaching the English language much easier. Echo poems can be defined essentially as "poems or verses where there is a repetition of the last word or syllable of a line" (Ng, 2017). There is ancient Greek mythology about a nymph named Echo, who was spellbound, which caused her to be unable to speak, apart from repeating the last word spoken by others. Before she was put under this curse, Echo was a talkative nymph. Due to this habit, she constantly interrupted the Greek goddesses in their conversations. Having become so tired of putting up with Echo's rude behavior, the latter put the curse on her. Some children may indeed have Echo's habit of interrupting others; hence the story can even serve a social purpose, other than as a novel way to explain the meaning of echo to young children.

Also, by using this mythical legend as a fun context for practice, young children can be drawn into playing the role of echoing words in an echo poem. With this simple but efficient exercise, educators can plan the curriculum to focus on an array of language parameters beyond speech sounds. For this paper, the aim is to elaborate and provide suggestions on using echo poems as the instructional stimuli to help young children learn ALL, which is the acronym for articulation, language and literacy. In learning to read, Gill (2006) has highlighted that the daily shared reading of poems, songs, and chants can provide students with pleasurable, successful reading experiences. Moreover, it can be the foundation for skill lessons in the context of real reading. Hence, echo poems can be the ideal stimuli for young children to have enjoyable practice in repeated reading to build their foundational skills.

ARTICULATION LEARNING

For the discussion here, the term articulation refers to one of the definitions found in the Merriam-Webster dictionary, which is "the act of giving utterance or expression" (http://www.merriam-webster.com/dictionary/articulation). A layman's term for articulation is pronunciation. As noted, young children often require repeated practice or the echoing of the sounds of a word in learning to produce intelligible speech for word retention and retrieval. A simple echo verse such Wag and Rag (Ng, 2017) below can be used for such a practice.

Wag and Rag (Ng, 2017)

Verse	Echo
The dog will wag	(wag, wag, wag)
its tail, like this.	(swish, swish, swish)
You use a rag	(rag, rag, rag)
to clean, like this.	(swish, swish, swish)

To make the reading more interesting, the teacher can show actual objects (a rag and a toy dog), pictures or videos to let the children see the swishing actions in Wag and Rag (Ng, 2017). More importantly, the speech sounds need to be modeled explicitly to be heard before the children practice. In other words, the verse should be read out clearly and then one may focus on the target words which are echoed for practice. In the example here, the target words "wag" and "rag" are both single-syllable rhyming words. This provides the opportunity during the lesson to segment the words into onset-rimes for learning how to articulate each word and learning the difference between them. An "onset" is the initial phonological unit of any word (e.g. /w/ in wag) whilst a "rime" refers to the group of letters that follow (i.e. /ag/ in wag). As the rime in both words are similar, the difference to be highlighted lies in the onsets /w/ and /r/.

As for the echoing practice, the children may echo together and then one after another as a variation. In this way, more opportunities for practice can be created, and each child can be heard individually as well. One can also add movement to the practice by improvising hand movements for the "swish, swish, swish". As young children enjoy nursery rhymes with music, another suggested enhancement is to use the tune of the song "The wheels of the bus go round and round" for this particular echo verse. The lyrics would then be replaced with, "The dog will wag –, wag, wag, wag / its tail like this –, swish, swish, swish" (Ng, 2017). Incorporating music and movement may take away the stress of the difficulties faced by some children in pronouncing phonemes such as the "w" and "r" in this rhyme.

Music can help in emphasising poem structure, the breaks in syllables or onset/rime etc., and therefore the use of music and movement for children to practice articulation can be

really helpful. To keep up to date, rapping with music will make a great addition to learning poems. On the other hand, the American clapping game song "Miss Mary Mack" shown below has been around for quite a while. It is an outstanding example of a traditional nursery song that employs the technique of echo poems. With the clapping and music, it is no wonder that the rhyme is still popular with children through the years. It is therefore a great idea to help children catch on to the song or game in an echo, so that it can become a hit which they would happily practice beyond the classroom.

Miss Mary Mack *(http://www.kididdles.com/lyrics/m008.html)*

Miss Mary Mack Mack Mack
All dressed in black, black, black
With silver buttons, buttons, buttons
All down her back, back, back.

She asked her mother, mother, mother
For 50 cents, cents, cents
To see the elephants, elephants, elephants
Jump over the fence, fence, fence.

They jumped so high, high, high
They reached the sky, sky, sky
And they didn't come back, back, back
'Til the 4th of July, ly, ly!

When working with young children, one might come across articulation problems in omissions such as /poon/ for /spoon/. Another type of error is in substitutions such as "wabbit" for "rabbit", which is often heard in the Bugs Bunny cartoons. The "Wag and Rag" rhyme above might then bring out this kind of substitution issue of /w/ for /r/. The children can be encouraged to think of more words that have the same beginning sounds to reinforce their learning and practice the alliteration of more words with these beginning sounds. When there are articulation errors, the teacher might want to model the word explicitly to see if the child is able to make a correct production of the target word after that. Should that fail, one might listen out for the particular sound production by the child with other target words and in other settings, such as the child's casual conversations during play.

According to the American Speech-Language-Hearing Association (2016a), articulation disorders impact the form of speech sounds and are related to structural issues such as cleft palate, and motor-based difficulties such as apraxia. Should a child refer to a spoon as a fork, it could just be a language difficulty whereby the child does not know the correct vocabulary. Hence, asking the child to say the name of the object (spoon) has its limitations. To assess the articulation, one needs to model the word (e.g. spoon)

for the child to repeat after. Only when the child is unable to make a correct production of the target word might there be reasons for articulation concerns. Data from other settings would then serve as evidence of articulation difficulties for intervention treatment.

ENVIRONMENTAL RISK FACTORS

Although articulation disorders are related to issues in the human bodily functions, for holistic assessment and treatment purposes, one should consider the environmental risk factors of the child. Some insights into the social world of children learning to talk can be found in the research by Hart & Risley (1999). These researchers reported that children from low Social Economic Status (SES) families hardly have any experience of talking about the stories that they have read or that have been read to them. The child's parents may be working at two jobs so there is very little time for interaction with the child. On top of that, the conversations that they have would tend to focus on the basic necessities of their daily living and would hardly ever dwell on anything that extends beyond their practical needs.

The primary factors responsible for the narrow focus of conversations are quite expected. Firstly, there is limited exposure to books as there are hardly any books in their homes. Secondly, the children are not adequately involved in activities for sports or leisure, much less travel. Lastly, children simply reflect the focus of the discussions that the adults around them would have. Despite these factors, Hart & Risley (1999) noted that the risk for a reading disorder will increase regardless of SES, when children are not read to interactively from an early age.

In their earlier study of preschool children's vocabulary learning, Hart & Risley (1995) language interactions with adults and exposure to different words were compared for children from different levels of SES. It was found that these measures were far lower for children of welfare families than children from working-class and middle-class families. Consequently, the children from welfare families knew the meanings of fewer words than the other children. Furthermore, the disparity in their vocabulary knowledge with other children increased over time as the children from welfare families were acquiring new vocabulary at a rate that is far slower.

One other finding of concern from the Hart & Risley (1995) study is the ratio of encouraging to discouraging statements heard per hour by the children. This is 6:1; 2:1; and 1:2 for children of professionals, working-class and welfare parents respectively. If children in low SES groups are likely to hear more discouraging statements than encouraging ones in comparison with other groups, the conditions for the development of their language would be impoverished further. It is therefore particularly important that teachers provide the children in their care with more verbal encouragement, so that conditions are more conducive to learn and children more motivated to practice language at school.

LANGUAGE LEARNING

The term "language" used for the discussion here refers to the English language used for communication. Echo poems can also be used to help children develop both receptive and expressive language skills. As highlighted by the American Speech-Language-Hearing Association (2016b), some of the problems preschool children have with understanding receptive language, are in the understanding of gestures, following directions, answering questions, identifying objects and pictures, and even taking turns when talking with others. Bartak, Rutter, & Cox (1975) have pointed out that receptive language difficulties are linked to a specific cognitive defect involving language impairment in children with autism.

As for expressive language, the American Speech-Language-Hearing Association (2016b) pointed out that young children may have issues in asking questions, naming objects, using gestures, putting words together into sentences, learning songs and rhymes, using correct pronouns, and even knowing how to start a conversation and keep it going. According to Caultield (1989), children with developmental expressive language disorder exhibit a delay in expressive language compared with receptive language and nonverbal cognitive skills.

With respect to receptive language, the swishing actions used in the "Wag and Rag" verse would help young children learn the gestures that correspond to the words used. The teacher can even tell the children to pretend to use a rag to clean in various ways, so that they can learn how to follow directions, or answer questions about the level of cleanliness. Beyond comprehending at the literal level, one might even help them develop inferential skills by talking about how tired one can get, having to do a lot of cleaning. In this way, they can become more empathic and considerate to people who carry out the cleaning work around them. Likewise, talking about why a dog would wag its tail can help them draw inferences about animal behavior in order to answer questions more logically.

A paper by Hess (2003) recommends a nine-step formula to teach language through poems to English as a second language (ESL) learners. The steps are – Trigger, Vocabulary preview, Bridge, Listen, react (X3) and share, Language, Picture, More language, Meaning, Spin-off. These steps may be a little tedious for young children. Since echoes mark the end of sentences, the echoed word can be used as a scaffolding to help young children identify individual sentences more easily for language comprehension. The echo verse "Lion and Fish" (Ng, 2017) below is an example to illustrate this. The echoes "den", "roar", "net' and "more" at the end of each respective sentence essentially provide the auditory cues that separate the sentences from each other.   Following that, the teacher can help them to focus on analyzing the structure of a sentence to identify the subject and predicate.

Lion and Fish

Verse (Sentence)	Echo (End of sentence)
The lion is in its den.	den
I can hear it roar.	roar
The fish is in the net.	net
I can catch some more.	more

By using "Who" for the subject, and "What" for the predicate, they can be taught how to sort out the parts of a sentence to identify a relevant part for a "Wh" question. The Scaffolding Interrogative Method (SIM) for teaching reading comprehension (Ng, 2014) below illustrates this:

Table 1. The Scaffolding Interrogative Method

Sentence no.	Who (What person/thing)	What (action/ description)	Where (What place)
1	The lion	is	in its den.
2	I	can hear it roar.	
3	The fish	is	in the net.
4	I	can catch some more.	

The SIM uses a matrix for sorting out a sentence into its "Wh" components so that one can easily process the underlying semantic category of information found in the sentence. Numbering the sentences help children identify each one by the row, and the "Who", "What", or "Where" headings help them identify the relevant information by the columns. To illustrate, for the question "Who is in the den?" the child can be directed to find "The lion" in Row 1 under the column "Who".

The rows and columns in the SIM also help in the teaching of pronouns. For example, the lion is referred to as "it" in Row 2, so the teacher can teach children to go back to Row 1 for the reference of the lion. The children can also learn how to identify objects and pictures corresponding to the words in the matrix under the semantic category of "Who/What/Where". For instance, if a picture of a fish in a net is used, children can be directed to find the subject "fish" in the "Who" column and the object "net" in the "Where" column.

Thus far, this paper has discussed how short echo poems can be used to help children answer questions, which may also help them ask questions, name objects, use gestures, put words together into sentences using the SIM matrix, learn the songs and rhymes, and even use correct pronouns. They can also be introduced to the typology of sentences, so that they can learn how to start a conversation and/or keep it going.

Table 2. Types of sentences (Ng, 2017)

Type of sentence	Example
Statements	The lion is in its den.
Questions	Do you hear the lion roar?
Commands	Raise your hand if you know the answer.
Requests	Please catch some more.
Wishes	May you be successful with the fishing!
Exclamations	How dark is this den!

Table 2 above shows the six types of sentences used in the English language. Young children who do not have much experience with using language may find it challenging to understand sentences and feel awkward. For instance, a child might think that a well-meaning wish statement "May you be successful with the fishing!" is a question, then he/she might not be able to continue the conversation with appropriate responses.
A child may also think that an exclamation such as "How dark is this den!" is a question, because "How", like "May", is an opening word used in questions. Thus, by pointing out the typology of sentences and recognizing the related intonation in echo poems, children can learn how to start or keep a conversation going with the right kind of sentences.

As listening skills are just as important as expressive skills, echo poems can also be used as a vehicle to teach turn-taking in a conversation. As mentioned, the teacher can use the story of Echo as the context for role play, so that the children can be engaged in playing the role of echoing words at the end of each line. Besides pretending to be spellbound like Echo in the story, the moral of the story can be used as a social story for children, as mentioned above. In this way, children can learn to practice socially pragmatic behaviour, and be guided into reflecting on behavioral expectations in social conversations.   Given the concept that echoing is sometimes a way to be a good listener in acknowledging what has been said, children can better appreciate the idea of turn-taking in conversations. They can then take turns to play the echo or read the verse. The teacher can include in the echo poem lesson a listening game where the children can score points if they managed to listen carefully to get the last word spoken correctly in their echo.

LITERACY LEARNING

As repeated readings of predictable texts and poems can help in the development of sight-word vocabularies, fluency, and phonics knowledge (Gill, 2006), it would make sense to use echo poems for learning literacy concepts as well. According to the Literacy and Numeracy Fact Sheet by the Department of Education and Training of the State of Queensland (2016), "literacy is the ability to read, view, write, design, speak and listen in a way that allows us to communicate effectively and to make sense of the world". The "Stages of Reading" by Chall (1983) shown in Table 3 below show us that the development of literacy (as in reading) can be charted out in stages.

Table 3 - Stages of reading Chall (1983)

Stage	Age (years)	Primary Development
0	Birth to 5-6	Accumulation of knowledge about letters, words, and books.
1	5 - 7	Initial reading or decoding.
2	7 - 9	Decoding becomes more automatic; beginning of reading for comprehension.
3	9 - 14	Reading to learn; decoding skills become fully automatic.
4	14 - 18	Multiple viewpoints due to increased cognitive skills, which enable abstract thinking.
5	18+	Construction and reconstruction in critical reading, development of hypothetical-deductive reasoning.

For the discussion here on literacy, the focus would be on Stage 1, which is initial reading or decoding. In order to decode print, children need to learn the print or alphabetic system that is used to generate the symbolic representation of the spoken word. Before children learn to read print, they would be in Stage 0, where they hear spoken English and develop phonological awareness to produce speech. By narrowing down their focus on speech sounds from sentences, whole words, syllables, onset-rimes to phonemes, the corresponding print symbol or orthography (i.e., the alphabet) can be introduced at the beginning of their development of print literacy.

With the association of a phoneme sound ("phon") to an alphabet icon ("ic"), children would be learning phonics (Ng, 2017). The easiest Grapheme-Phoneme Conversion (GPC) or phonics rule to start off with uses one-to-one correspondence (1:1) and is called one-letter-one-sound rule. To begin with, one might find it easier to teach this with words like "mum", "dad", "bib" and "pop" with similar beginning and ending consonants like "pup" in the echo verse "Pup and Cup" (Ng, 2017) shown below.

Pup and Cup (Ng, 2017)

The young dog is a pup.	(pup)
It drinks milk to grow bigger.	(ger)
The tea is in my cup.	(cup)
It needs some milk and sugar.	(gar)

For the development of 1:1 correspondence, children need to be taught to segment simple consonant-vowel-consonant (CVC) words into its individual phoneme sounds, so as to match each sound to a letter symbol used to represent the respective sound. Hence "pup" would be segmented into its individual phoneme components /p/, /u/, /p/ for the teaching of the respective symbol or alphabet that represents the sound. To scaffold the segmentation of the phonemes and selecting the respective letters to form the word, one might consider employing the tool known as Elkonin sound boxes (http://www.readingrockets.org/content/pdfs/Phonics-Sound-Elkonin-Boxes.pdf). The teacher can first model the segmentation by saying "pup" - /p/, /u/, /p/; and then write the letter symbol into each box with each phoneme sounded out again. Letter cards can be used for children who have difficulties writing the symbols. This is illustrated as follows:

Example: "pup" - /p/, /u/, /p/

p	u	p

With this 1:1 correspondence strategy, children can learn to read many new words or even nonsense words by applying the rule. For example, by substituting "c" for "p", the word "cup" from the echo verse would be formed. From this, children can be given opportunities to generate word families with similar ending sounds even make their own rhymes.

The challenging part of teaching young children phonics is that they can get stuck in only one rule such as this one-letter-one-sound rule. There is in fact, an array of conventions governing the way that letter symbols are sounded. For example, when "c" is followed by "e", "i", or "y", it makes an /s/ sound instead of the /k/ sound in words such as "cent", "pencil", and "cymbals". This convention is similar for the letter "g" as it makes the /j/ sound instead of the /g/ sound in words like "gentle", "giraffe", and "gymnastics".

The development of print literacy can be taught in an expansionary way from the one-letter-one-sound rule (1:1) to digraphs (2:1), trigraphs (3:1), and to more complex phonograms or orthography. The recommended order in learning orthography reverses that in learning phonological awareness. This is illustrated in Figure 1 with an hourglass model.
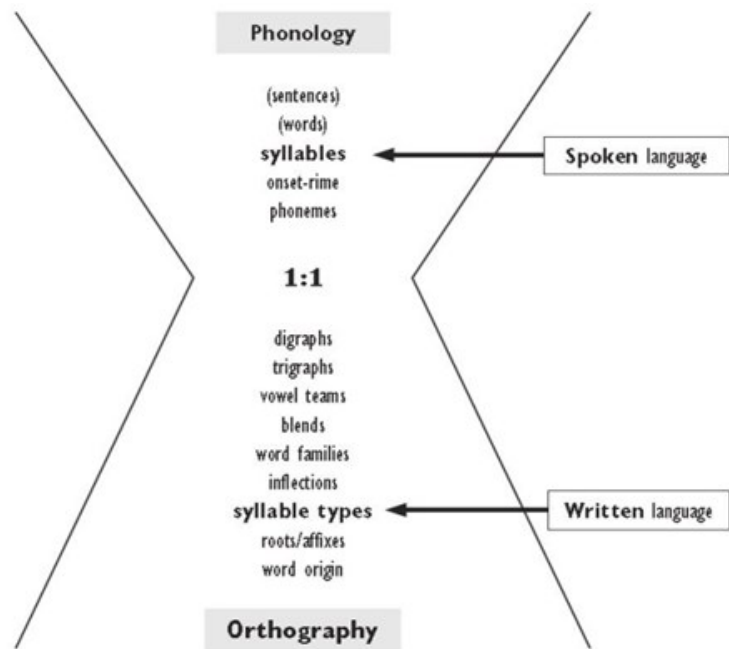
Figure 1. Oral and Written Language (Moats & Tolman, 2009)

In the English language, there are forty-four phonemes (speech sounds) and an array of phonograms (letter pattern symbols) has been developed to represent each of them. For example, Table 4 illustrates the use of eleven phonograms to represent the same sound which is the long "ā" sound (Ng, 2017).

Table 4. Long "ā" Phonograms

Long "ā"						
Phonogram	a	ai	eigh	aigh	ay	et
Example	babe	sail	weigh	straight	ray	crochet
Phonogram	ei	au	a-e	ea	ey	
Example	vein	gauge	gate	break	they	

Learning various phonograms for a phoneme such as the long "ā" sound can be overwhelming for young children. Some children might resist the idea of variation and cling on to the 1:1 concept of short vowel sounds for stability purposes. Hence, teachers would need to show more understanding and support. The issue can be made worse when they are confused by the alphabetic code used to learn speech sounds in languages like Malay, Chinese or Japanese where different phonics rules are applied. For instance, in the Chinese alphabetic code "hanyu pinyin", the long "i" is sounded for

the phonogram "ai". Hence, in English, children might sound the word "dairy" as "diary" (Ng, 2017).

Unlike articulation disorders, "speech sound disorders that impact the way speech sounds (phonemes) function within a language are traditionally referred to as phonological disorders; they result from impairments in the phonological representation of speech sounds and speech segments—the system that generates and uses phonemes and phoneme rules and patterns within the context of spoken language. The process of perceiving and manipulating speech sounds is essential for developing these phonological representations" (American Speech-Language-Hearing Association, 2016a). Used as the contextual vehicle, the rhymes in echo poems can serve well for the gradual introduction of such rules and patterns to make the learning easier and fun at the same time for children with phonological disorders.

According to Gill (2006), phonics has received renewed attention since the National Institute of Child Health and Human Development (2000) NRP report concluded that phonics instruction produces substantial benefits for students from kindergarten to grade six and for students with difficulties learning to read. As noted by Shaywitz (1996), based on the clinical symptoms and neuroscientific knowledge of brain organization and function, the reading difficulties in dyslexia are based on a model of phonological processing. This would imply that it would be appropriate to target phonics instruction with the use of echo poems for those at risk of dyslexia. With regards to this, it should be noted that the NRP (National Institute of Child Health and Human Development, 2000) also reported that there is no single method of teaching phonics that has been proven to be superior to another. What has been suggested is that educators ensure that students know the purpose of learning letter sounds and further to that, have the ability to apply what they have learned (Gill, 2006).
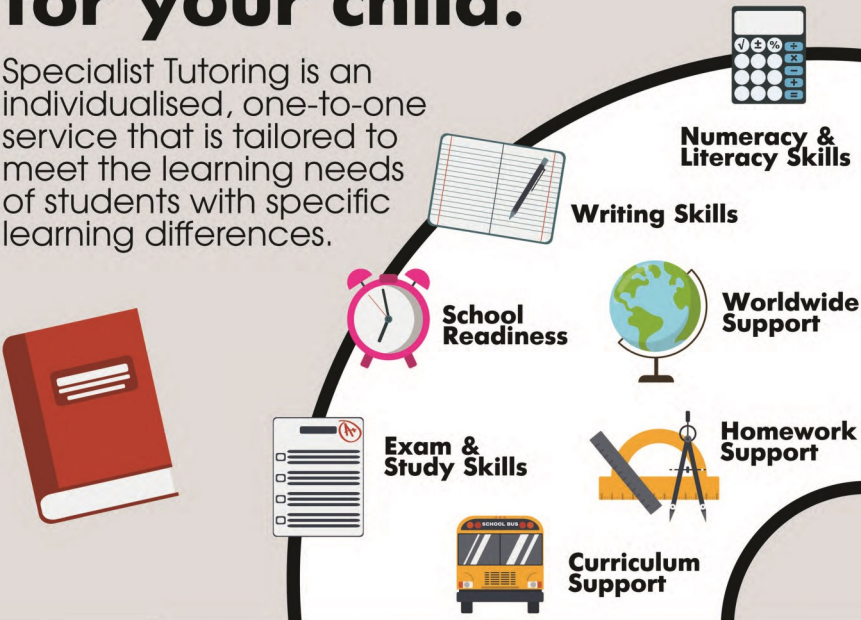
CONCLUSION

In summary, this paper has highlighted that echo poems can be used to help young children learn ALL - articulation, language and literacy. The meaning of each of the terms ALL is elaborated upon, together with suggested use of echo poems for the teaching of each of the respective conceptual terms. In addition to this, some of the issues surrounding the difficulties that young children may have in learning ALL are discussed. These issues include those of articulation disorder, language disorders (developmental receptive and expressive language disorders), and the phonological processing disorder that forms the basis of dyslexia. It is hoped that this paper can help educators and parents better understand children's needs in learning ALL and discover how best to help them overcome the possible challenges. In doing so, children might feel more supported, encouraged and motivated to work towards better outcomes in their articulation, language and literacy.

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The importance of creative and positive workplace culture: A case study on how creative initiatives foster better relationships, resilience and mindfulness at work for Special Education Teachers.

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Abstract

Positive workplace culture is vital in nurturing teamwork, increasing productivity, resilience and nurturing mindful individuals over time. This aligns with the essential nature of optimism and how crucial it is to have a career that emotionally and mentally fulfils, challenges and centres us; most of us do spend almost half of our time in the workplace after all. This notion is especially pivotal for Special Education teachers (both new and experienced) who encounter high levels of occupational stress which usually result in burnout, poor teaching, and attrition. Special Education Needs (SEN) teachers like DAS Educational Therapists are at a higher risk of burnout when compared with other professionals (Ram & Samsudin, 2019). The well-being of therapists and the quality of lessons delivered in the classrooms are closely related. Feelings of not belonging, and lack of support, meaning and motivation for the job will trample the performance of individuals in the Special Education Needs Industry. The evolution of challenges in the Education industry is inevitable. However, the opportunity to create a more holistic and healthy workplace platform can easily be achieved based on the approach of adopting fun at the workplace, born out of mindful initiatives. This study has been pieced together to create awareness on how creative and mindful initiatives like gathering for purposeful activities proved to enhance working experiences and camaraderie. In this descriptive case study, we will delve into how a particular group of Educational Therapists from centre 'X' seeded the culture of including fun at the workplace through one mission-based game. This initiative to welcome new colleagues into the workplace was developed to foster better relationships and enrich the workplace culture for this group of Educational Therapists. Eventually, it became a part of learning centre X's culture. The main cultural trend that binds this study is the increase in collective creative efforts and how this can lead to better productivity, rise in resilience through a better support system at work and, ultimately, the nurturing of mindfulness and well-being.

Keywords: Mindfulness, happiness, resilience, workplace culture, creativity, purpose and meaning, positive psychology, well-being.

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INTRODUCTION

Educators are frequently faced with the difficult task of meeting the academic, social, and emotional needs of diverse learners in their classrooms – a task of even greater difficulty in the present context of high-stakes testing and teacher accountability (Darling-Hammond & Sykes, 2003).

Special Education teachers particularly are at high risk for burnout as their working conditions align with many factors associated with burnout. One of the most important challenges in the field of special education is developing a competent workforce and creating work environments that sustain special educators; involvement, passion and commitment.

As Educational Therapists from the Dyslexia Association of Singapore, our educators are guided through three weeks of intensive pre-service training that nurtures and prepares them for their roles as impeccable educators. Although the comprehensive training empowers our educators with the tools of the craft to cognise and apply on the ground, challenges beyond the educational nature do take centre stage, especially if you are a new teacher. A particular challenge for most Educational therapists at DAS lies in the unsocial working hours, with the majority of teaching in the evenings and weekends.

DAS generously caters to the needs of our students as much as possible and one of the efforts that is clearly apparent is to accommodate a student's schedule as far as possible. In view of this, lessons take place in the afternoon from 2 pm onwards. However, given the fact that most of our students attend extra-curricular activities after school, a large number of classes take place between 7 pm to 9 pm. The working hours are sensitive to the respective location a learning centre may be situated at. For instance, if a centre is located within a school premise, the last class ends at 6.30 pm. If a learning centre is located amidst a residential environment, classes end at 9 pm. This is the case in 9 out of our 14 learning centres, which includes learning centre X.

In a series of studies, low control over work hours was found to increase the risk of health problems (e.g., psychological distress and sickness absence), particularly for women (Ala-Mursula, Vahtera, Kivimaki, Kevin, & Pentti, 2002; Ala-Mursula, Vahtera & Pentti, 2004).

There is a strong correlation between working hours and the well-being of an individual. Large-scale longitudinal panel studies including objective mental health measures suggest that working long hours has negative consequences for health, well-being, leisure and families (Kivimäki et al., 2015). They impede an ability to care for oneself, leads to exhaustion, burnout, occupational stress, depression, anxiety and other mental health disorders (Bannai & Tamakoshi, 2014; Ng and Feldman, 2008; Theorell et al., 2015; Virtanen et al., 2018). In some studies the effects start at a lower working hours threshold for women than for men (Dinh et al., 2017; Virtanen et al., 2011). This is

especially a concern for the DAS as the majority of our therapists are females.

Besides grasping the unique design of the working hours at the DAS, new teachers are also faced with having to acquaint themselves with new work environments and a culture that involves forming new connections with their colleagues. Fostering a meaningful connection with others is one of the most important aspects of life and is linked with higher subjective well-being as it is one of our basic human needs (Fredrickson & Losada, 2005).

People thrive when they are happier. When our mood becomes brighter, we set higher goals and persist longer towards achieving them. We experience less stress and fatigue and show better team cooperation and problem-solving. Taylor (2008) argued that happiness consists in exercising creative intelligence.

But how do we make people happier?

A body of research on happiness states that our moods are contagious. This takes effect because of the mirror neurons in our brains.

The human brain is peppered with mirror neurons and they activate in us exactly what we see in the other person: their emotions, their movements, and even their intentions (Goleman, 2011).

So if we are surrounded by positive and nurturing conditions and individuals, our brain cells pick up on these signals and naturally act upon them by demonstrating complementary actions and behaviours.

It is clearly evident that there is a correlation between the climate of an environment and its impact on the euthenics of its populace. Meaning the science of improving the internal well-being of the human by improving the external factors of their environment.

The impact of our Educational Therapists at learning centre X fuelling the responsibility of conducting a holistic workplace culture through a spirited environment stands testament to the rich research base on well-being, happiness, positive psychology, mindfulness and resilience.

HAPPINESS

One of the strongest predictors (and not only correlates) of happiness is social relationships. In fact, to be happy we need to spend six to seven hours a day in social settings, and up to nine if our jobs are stressful (Rath & Harter, 2010). The Adaptation theory predicts that although happiness reacts to both negative and positive life event, it returns to baseline shortly afterwards. Theories on Hedonic and Eudaimonic well-being

clearly show that there is much significance in the coexistence of these respective theories. One adds value to the other. And one can only be realised if not for the other's existence. Hedonic well-being, for instance, strives for the maximisation of pleasure and minimisation of pain. Eudaimonia, on the other hand, encourages a deeper connection with subjects, searches for meaning and purpose and sustainable wellness. It is a belief in achieving happiness through prudence. Here, Hedonic well-being is subjective and Eudaimonic well-being is objective and purposeful.   In the case of Learning centre X, there's a strong presence and flattering symphony of these well-being theories.

There were initiatives to create a pleasurable environment on designated days of the week, where during the term the mission-based games mentioned below were played. Whilst the momentary indulgence of the activities took over, it strengthened the relationships, bond and culture of the learning centre. It not only thrived on the hedonic nature of the activities where dopamine, endorphins, and oxytocin arousing symptoms were a consequence but evolved into the self-actualisation of the Educational Therapists. Furthermore, the initiatives sustained the spirit of this approach and eventually nurtured the seed of Eudaimonia driving wellness amongst the team. In summary, the outcome of the physical environment created to inject entertainment at the workplace yielded positive consequences that led the Educational Therapists to nurture a resilience This was possible through the identification and realisation that a moment's experience holds much more value when experienced with *deep connection and presence* in order to tap the feeling it evoked during trying times. An essential mindfulness-based trait.

MINDFULNESS AND RESILIENCE

Resilience is the process of effectively coping with adversity. It's about bouncing back from trying situations. Resilience is not a personality trait; it involves a way of paying attention, thinking, and behaving that anyone can learn. It is teachable and influential. Defined as "a dynamic process encompassing positive adaptation within the context of significant adversity" (Luthar et.al., 2000), empirical research shows that resilience can be shaped by how we interpret the adversities we face (Yeager & Dweck, 2012). Meaning that it's neither purely a factor of our traits or our surroundings, but can be improved, developed, and nurtured (Kim-Cohen, 2007).

A study highlighting the link between mindfulness and resilience in the Journal of Personality and Individual Differences found that "Mindful people can better cope with difficult thoughts and emotions without becoming overwhelmed or shutting down emotionally (Bajaj & Pande, 2016). "Pausing and observing the mind may (help us) resist getting stuck in our story and as a result, empower us to move forward. Understanding the phenomena what resilience in itself is, we must not forget that it takes communal strength to raise and nurture resilience through effective activities, especially in the fast-paced and challenging environment that Special Needs Education teachers work in. It is this very quality that was apparent in the mission-based games that

identified and saw the dawn of our Educational Therapists' individual strengths; both hard or soft skills.

Knowing our strengths helps with greater vitality and motivation, a clearer sense of direction, higher self-confidence, productivity and a higher probability of goal attainment (Clifton & Anderson, 2001-2; Hodges & Clifton, 2004; Peterson & Seligman, 2004).

POSITIVE PSYCHOLOGY

Positive psychology is a science of positive aspects of human life, such as happiness, well-being and flourishing. You will notice that these features appear to evidently encapsulate the foundation of this study- promoting positive workplace environment. It can be summarised in the words of its founder, Martin Seligman, as the 'scientific study of optimal human functioning that aims to discover and promote the factors that allow individuals and communities to thrive' (Seligman & Csikszentmihalyi, 2000).

It is also notable that positive psychology focuses on potentials of individuals rather than the limitations well-known in a typical psychological study. Its aspiration is to bring solid empirical research into areas such as well-being, flow, personal strengths, wisdom, creativity, psychological health and characteristics of positive groups and institutions (Boniwell, 2012).

There are three main levels in the science of positive psychology. The subjective level, the individual level and the group level. This study is in identifies with the group level as we are dealing with a learning centre with 16 educational therapists. At 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 and reaching beyond oneself (Boniwell, 2012). This theory complements the positive work culture of Centre X.

WHY SYNTHESISE THIS STUDY?

Amidst upholding the duties of an educator, some of the common factors that put teachers at risk of stress-related symptoms include: lack of administrative support (Skaalvik & Skaalvik, 2007), paperwork (Billingsley, 2004), challenging student behaviours (Hastings & Brown, 2002), role overload (i.e., the experience of too many unique demands on one's time and resources; (Adera & Bullock, 2010), and expectation-reality mismatch, which occurs when the pre-service expectation of teaching does not align with the reality of what the teacher experiences in the classroom (Zabel, Boomer, & King, 1984).

Given the psychological resources, this requires, one of the principal drivers of passion for this craft comes from our educators' working environment. Having been new teachers

in the craft themselves, the senior teachers at learning centre X had the opportunity to gradually build on their experiences individually and bring these together collectively. This was achieved through regular conversations in the staff room, to welcome new staff, (whether teachers or administrative teams), warmly with a joyful culture in place.

The intention of this study was to create awareness of how creative and mindful initiatives of gathering for purposeful activities proved to enhance working experiences and camaraderie. Furthermore, this culture and attitude proved useful in many situations: these include, when a fellow educator is challenged with work-based or personal trials, encouraging one another with welcome gifts when a new school term starts, planning surprises for birthdays and farewells, and writing positive notes to one another during trying terms. Moreover, ensuring that the mental and emotional health of staff members not being shadowed by external factors, especially being situated at the void deck of a block of flats. This was achieved by injecting fun in the workplace through mission-based games.

The culture of any workplace stems from what the people working there have made out of it. Culture shapes our work enjoyment, work relationships, and work processes. Each learning centre's culture is unique to its people. It is made up of the various experiences and expertise people bring to the work premise. It is also shaped by various personalities and their individual cultural richness. Past research has also shown that workplace culture influences employee levels of emotional wellbeing (Hartel and Ashkanasy 2011). Other elements of culture, such as shared beliefs and collective behaviours may be influenced by embedding virtues in organisational behaviour, leadership (Cameron et al., 2011). It takes a great level of mindfulness to bring together the seams of a particular workplace culture. In mindfulness, awareness is a capital feature mentioned in many literatures and informational representations. Mindfulness is metacognitive in the sense that it involves a meta-level of awareness that monitors the content of consciousness itself (Nelson et al.,1999).

 The observance and appraisal of certain events, emotions and outcomes helps us register and decide if we want to be part of the experience again or not. Cultures are also made up of events that bring about positive emotions in people. The strength of a culture prevails especially when work gets more demanding.

WORKPLACE CULTURE

Culture is the environment that surrounds us all the time. Workplace culture is the shared values, belief systems, attitudes and the set of assumptions that people in a workplace share. This is shaped by individual upbringing, social and cultural context. In a workplace, however, the leadership and the strategic organisational directions and management influences the workplace culture to a huge extent.

Fun is one of the positive phenomena in the workplace and includes social events, recognition of personal milestones, public celebrations, humour, games entertainment, opportunities for personal development, joy, play and fun titles (Ford, et al., 2003, Grant et al., 2014). As Owler and colleagues (2010) stated that everyone wants to have fun at work and it has positive consequences for employees. Having fun at work has far-reaching effects on employees and organisations. For example, fun positively affect employees' job satisfaction, commitment, creativity, energy, organisational citizenship behaviour, productivity and negatively affects absenteeism, anxiety, emotional exhaustion, turnover and burnout (Tews et al., 2012).

A positive workplace culture improves teamwork, raises the morale, increases productivity and efficiency, and enhances retention of the workforce. Job satisfaction, collaboration, and work performance are all enhanced. Furthermore, most importantly, a positive workplace environment reduces stress in employees. The fundamental belief that permeates environments such as learning centre X is that fun in the workplace is a central means to promote engagement, cohesive relationships, creativity, and better employee health. Caccamese (2012) argues that although engaging in fun at the workplace does not necessarily create a great workplace, it does help to boost employee camaraderie, build trust, and motivate people to be themselves. Good workplace culture should nurture and encourage its employees to flourish. This should also encourage us to deepen our understanding of sustainable happiness that comes from the practice of Eudaimonia, which is a Greek philosophical concept contributing to well-being, related to self-realisation, human flourishing, prosperity or blessing. Aristotle was the originator of eudaimonia (from daimon=true nature) (Boniwell, 2011). Aristotle (1985), in his Nicomachean Ethics, takes as a starting point that humans want the best possible life, and uses the term "eudaimonia" to refer to the type of life one thinks best, or most worthwhile, or most desirable (Ackrill, 1973). Sometimes it is translated from the original ancient Greek as welfare*,* sometimes flourishing*,* and sometimes as well-being (Kraut, 2018). Aristotle thought that true happiness is achieved by leading a virtuous life and doing what is worth doing. He argued that realising human potential is the ultimate human goal (Boniwell, 2011). This notion highlights the achievement of happiness through prudence. Eudaimonia well-being emboldens the need to find meaning, purpose and connection in our actions that can weather challenges and trying times, especially in a job that can be psychologically demanding. When we engage in meaningful activities, we find value in them and naturally will connect with the experience on a deeper level. For this to work, we must first understand hedonic pleasure which focuses on maximisation of pleasure and minimisation of pain. It is a concept of diminishing negativity completely and distracting oneself with fleeting activities that yield enjoyment. However, this may result in incompetency when expected to manage problems one may have dismissed in efforts to 'escape'.

Empirical demonstration of the distinctions between eudaimonia and hedonic happiness have important implications for research on psychological well-being (Diener, 1984,

Emmons, 1986, Ryff, 1989). Both eudaimonia and hedonic happiness have been found to be significantly correlated with a variety of cognitive-affective qualities associated with a positive emotional tone, with significant differences in the strength of the associations found for several of the qualities. Consistent with the distinctions drawn between the two subjective conditions, eudaimonia was found to be significantly more strongly correlated with having clear goals, feeling assertive, and investing a great deal of effort in an activity, while feeling happy, feeling relaxed, and forgetting one's personal problems were more strongly associated with hedonic enjoyment.

In relation to this, as much as learning centre X injected elements of fun at work, the Educational Therapist were observed to have not disregarded ongoing challenges. They mindfully acknowledged stressful periods, challenges or a 'bad day', and engaged in games, team bonding and gatherings as means of re-calibrating their energy levels and building resilience. This is a classic example of valuing and demonstrating eudaimonic well-being because of the responsibility the Educational Therapist had shown in managing their emotions, energy, work processes and striking a balance with breaks. This is closely related to 'human flourishing' tendencies. Studies show that challenges and obstacles can be reinterpreted as opportunities and strength-building experiences rather than as tragedies or problems (Gittell, Cameron, Lim, & Rivas, 2006; Lee, Caza, Edmondson, & Thomke, 2003; Sutcliffe & Vogus, 2003). Since the days of Aristotle, happiness has been conceptualised as being composed of at least 2 aspects – hedonic (or pleasure) and eudaimonia (a sense that life is well-lived) (Kringelbach & Berridge, 2010).

> *"On a day-to-day basis most jobs can't fill the tall order of making the world better, but particular incidents at work have meaning because you make a valuable contribution or you are able to genuinely help someone in need"* (Ciulla, 2000).

Additionally, a prevailing feature amongst the Educational Therapist at learning centre X was good human connection. The proximity, intensity and efforts made to make these connections was evident from the survey conducted on 'The relation between workplace culture and happiness', where the Educational Therapist were asked: 'Given the division of the centre's design (main office and annexe), do you make an effort to socialise with most of your colleagues at least once a day- even on a tight schedule?' (Figure 1).

Lieberman (2013) compiled extensive research evidence demonstrating the importance of human connections for human beings as a core element of human nature. According to Lieberman, human connections are an essential part of the welfare of our societies, due to their roles in the promotion of health and the prevention of physical and mental illness.

According to Dutton and Ragins (2007), too often work and work relationships are not included in lists of things that make life worth living. Paradoxically, people spend much

Given the division of the centre's design(main office and annex), do you make an effort to socialize with most of your
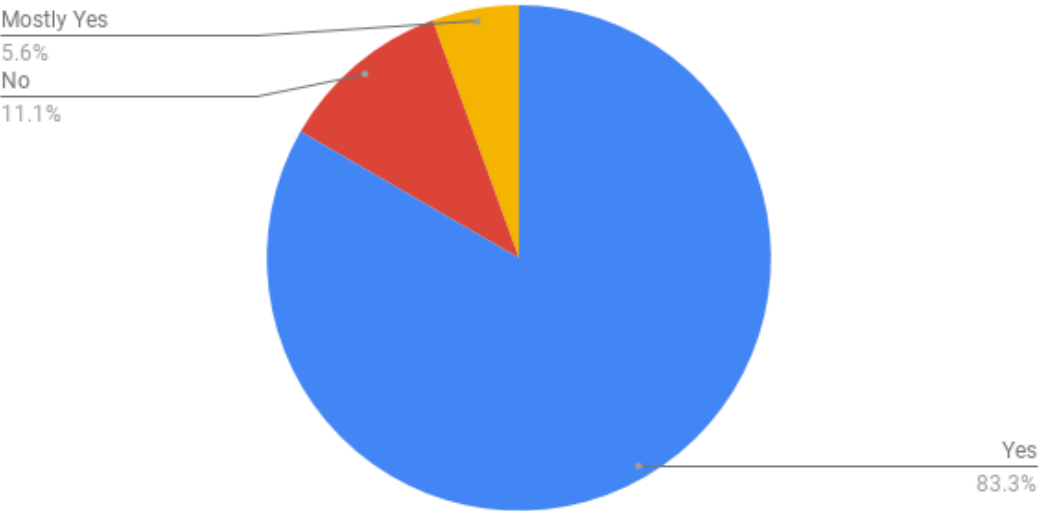
Mostly Yes
5.6%
No
11.1%

Yes
83.3%

Figure 1: Measuring the readiness to connect amidst a busy schedule.

of their time at work and, consequently, work relationships become central, not only for how work gets done but also for the quality of their lives. In the words of these researchers, those relationships "can be a generative source of enrichment, vitality, and learning that helps individuals, groups, and organisations grow, thrive and flourish" (Dutton and Ragins, 2007, p. 3). Such relationships become even more meaningful when they develop in stressful situations.

Evolution has wired us to connect with others for survival. These connections have the power to affect how we feel. According to research on happiness, our moods are literally contagious. This happens because of mirror neurons in our brains, as mentioned above (Positive psychology, 2019). Therefore, the concept of culture at workplace is highly vital in nurturing passionate and contented individual, especially for educators who ration a large amount of their energy on making a difference in another individual's life.

By creating positive engagements, connections, meaning, and acknowledgement, it is evident through the spirit of learning centre X that we can create a motivated workforce which people want to be part of, and improve the organisation and themselves.

WHAT IS 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 emotions, and thereby improving their health and well-being (Carmody & Baer, 2008; Grossman, Niemann, Schmidt, & Walach, 2004). In this sense, mindfulness is viewed as a state and not a trait, and while it might be promoted by certain practices or activities (e.g. meditation), it is not equivalent to or synonymous with them.

Mindfulness has similarities to other psychotherapy-related constructs. For example, mindfulness is similar to mentalisation (Bateman & Fonagy, 2004, 2006; Fonagy & 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 affect regulation and cognitive flexibility (Wallin, 2007). However, Mindfulness also differs from mentalising in that mindfulness is both being aware of the "reflective self" engaged in mentalising, and the practice of fully experiencing the rising and falling of mental states with acceptance and without attachment and judgment.

Considering this, the initiatives carried out by learning centre X cater to the idea of accepting the day to day challenges that come with the job, and how the Educational Therapist chose to initiate the mindful practice of creating awareness by injecting elements of fun and positivity at the workplace. Moreover, germane to the observer's account of learning centre X, organisational research indicates that individual mindfulness is positively related to employee outcomes such as work engagement (Leroy et al., 2013) and job performance (Dane & Brummel 2014), suggesting that mindfulness contributes to an organisation's bottom line. Essentially, individual mindfulness describes an individual's state of consciousness, characterised by heightened awareness and attention, often accompanied by a sense of being 'in the moment' (Sutcliffe et al., 2016).

The communal efforts of the 16 Educational Therapists at learning centre X have collectively brought together a favourable outcome over a period of two years. It is also noteworthy that collective (or organisational) mindfulness, is a social phenomenon and refers to a state of shared awareness and attention that emerges from interactions between multiple actors, "a totality with intricately connected and interdependent components, from which organisational mindfulness emerges at the system level." (Carlo et al., 2012:1102)

COLLECTIVE MINDFULNESS

Collective mindfulness was originally developed to explain how high-reliability organisations (HROs) avoid catastrophe and perform in a nearly error-free manner under trying conditions. Over time, the focus has expanded to include "organisations that pay close attention to what is going on around them, refusing to function on 'auto-pilot'" (Ray et al., 2011, p. 188; also see Fiol & O'Connor, 2003).

Research on collective mindfulness exhibits greater definitional coherence than its individual analogue. This is primarily a function of Weick et al's., (1999) highly influential work, which introduced the concept to organisational psychology and organisational behaviour and has continued to serve as the canonical conceptualisation. Their definition of collective mindfulness is alternatively referred to as mindful organising and originally builds on the individual-level work of Langer (1989) and her three aspects of mindfulness (Weick et al., 1999).

Table 1: Collective mindfulness

SOURCE	DEFINITION OF COLLECTIVE MINDFULNESS
Ausserhofer et al., (2013, p.157)	To stay mindful, despite hazardous environments, frontline employees consider constantly five principles: tracking small failures, resisting oversimplification, remaining sensitive to operations, maintaining capabilities for resilience, and taking advantage of shifting locations of expertise.
Hargadon & Bechky (2006, p. 486)	Describes the amount of attention and effort that individuals allocate to a particular task or interaction, and, through mindful interpretation by group members of ongoing experience and the mindful generation of appropriate actions, collective cognition connects individual ideas and experiences, both redefining and resolving the demands of emerging situations.
Valorinta (2009, p. 964)	Mindfulness refers to processes that keep organizations sensitive to their environment, open and curious to new information, and able to effectively contain and manage unexpected events in a prompt and flexible fashion.

The various definitions of collective mindfulness draws our attention to certain main key concepts: sensitivity, resilience, attention, effort, interaction, mindfulness, cognition and curiosity. In order to engage perceptively on the grounds of mindfulness, an individual needs empathy. The willingness to walk in the shoes of another. "Empathy involves an ability to perceive others' feelings (and to recognise our own emotions), to imagine why

someone might be feeling a certain way, and to have concern for their welfare" (Reiss, 2018). The aptitude to bond empathically with others and feel with them, to care about their well-being, and to act with compassion, is critical to our lives, helping us to get along, work more effectively, and thrive as a society.

As relationships take a more primary role in organisational life, we need to be able to transform relationships from states of just "getting by" and surviving to states of thriving (Harvey & Pauwels, 2003; Spreitzer, Sutcliffe, Dutton, Sonenshein, & Grant, 2005).

As Berscheid (1999) so eloquently observed, "relationships with other humans are both the foundation and the theme of the human condition: We are born into relationships, we live our lives in relationships with others, and when we die, the effects of our relationships survive in the lives of the living, reverberating throughout the tissue of their relationships"

METHODOLOGY

Participants

The participants involved in this case study are 16 Educational Therapists ranging between 2-7 years of service from a particular learning centre that brought about the trend of including mission-based games at the centre level. These group of Educational Therapists were particularly chosen because the observer articulating this case-study is a resident Educational Therapist at learning centre X and has developed a mindfulness-based well-being initiative for the DAS based on a concentrated fraction of inspiration drawn from the positive workplace culture cultivated at this learning centre.

A range of other mindful initiatives within this centre were team lunches, collaborative decision-making sessions to solve student or parent related challenges, positive note writing culture, termly gift exchanges to encourage one another, birthday surprises planned for the educational and administrative staffs, and communal get together in the staff room to ensure the team is performing well. Ultimately, this has also instantiated the nature of empathy, sharpened psychological capital and build resilience amongst the educators at this centre.

Research Design

This study will be taking the approach of a descriptive case study based on naturalistic observation which views participants in their natural environments for greater ecological validity. This ecological validity serves as a tool to use this case study in real-life situations. The given situation that describes the culture of the work environment, the people working in it, the mindful initiatives and the outcomes of how the Educational Therapists remain resilient during times of challenges.

Ethical Statement

Ethical considerations have been put in place right from the point of initial observation stages and development of this case study. Research participants will not be subjected to harm in any way whatsoever. Participants' dignity will be prioritised at all times and full consent will be 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 in accordance to, 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).

Procedure

My study classifies the positive and productive outcomes of the mission-based games from 2016-2018. However, the inception of mission-based games came about in 2014 where we were paired with another colleague through random picking of names from a box and assigned to them as a 'mortal'. This makes the person picking the name an 'angel'. The mechanics of the game can be broken down to three significant levels. 1) To guard and fend for your designated mortal. This requires an angel to look out for the mortal, ensure they are coping well at work, buy small gifts or leave them notes of encouragement. 2) The code of secrecy. Angels will have to swear into the secrecy of their identity and ensure that their mortal is kept on their toes deciphering who their angel might be. This adds to the surprise element. 3) There were missions to be accomplished in order to earn a clue about your respective angel. The missions ranged from solving puzzles, accomplishing tasks like taking a selfie with your mortal without arousing suspicion or even taking a photo with an item that belongs to their mortal.

What was clearly observed here was the level of awareness and attention one must have to participate and conquer these missions. Awareness and attention are the fundamental concepts of mindfulness. Learning centre X was optimising these concepts to their best advantage and nurturing and regulating the hippocampus. As an important role player in the limbic system, the hippocampus is involved in the formation of new memories and is also associated with learning and emotions, the amygdala plays a key role in the processing of emotions, and forms part of the limbic system and the pre-frontal cortex which is implicated in planning complex cognitive behaviour,

personality expression, decision making, and moderating social behaviour.

The following e-mail data are the preliminary structure of this initiative.

Data collection and analysis

Besides the observation from the researcher, two fundamental surveys were undertaken.

 i. The relation between workplace culture and happiness and
 ii. The impact of a workplace setting that nurtures mindfulness through creativity, will be used to further accentuate the case study.

The surveys cover two main themes. The first being sustainable happiness through a culture which is born from enhancing the euthenics of individuals, and the second being how a well-nurtured environment invokes natural mindfulness in the day-to-day actions of the Educational Therapists at learning centre X. Additionally, text mining such as word frequency from responses and tabulation of the connection between the collective initiatives and mindfulness were drawn to understand the parallels and adaptability of mindfulness.

Objective Data was collected from 16 employees who work at the learning centre 'X'. We used questionnaires and data were collected through a survey. The survey composed of two main themes. The first being sustainable happiness through a culture which is born from enhancing the euthenics of individuals, and the second being, how a well-nurtured environment invokes natural mindfulness in the day-to-day actions of the Educational Therapists at learning centre X.

Questionnaires

The questionnaires were curated considering the climate of learning centre X's social environment and how evidently the relationship amongst colleagues have flourished as observed by the researcher. The types of questionnaires chosen for the survey are Open-ended, Likert scale and Dichotomous questions. The intentional design behind these questions was to extract the specific response that displayed evident connection amongst the Educational Therapists.
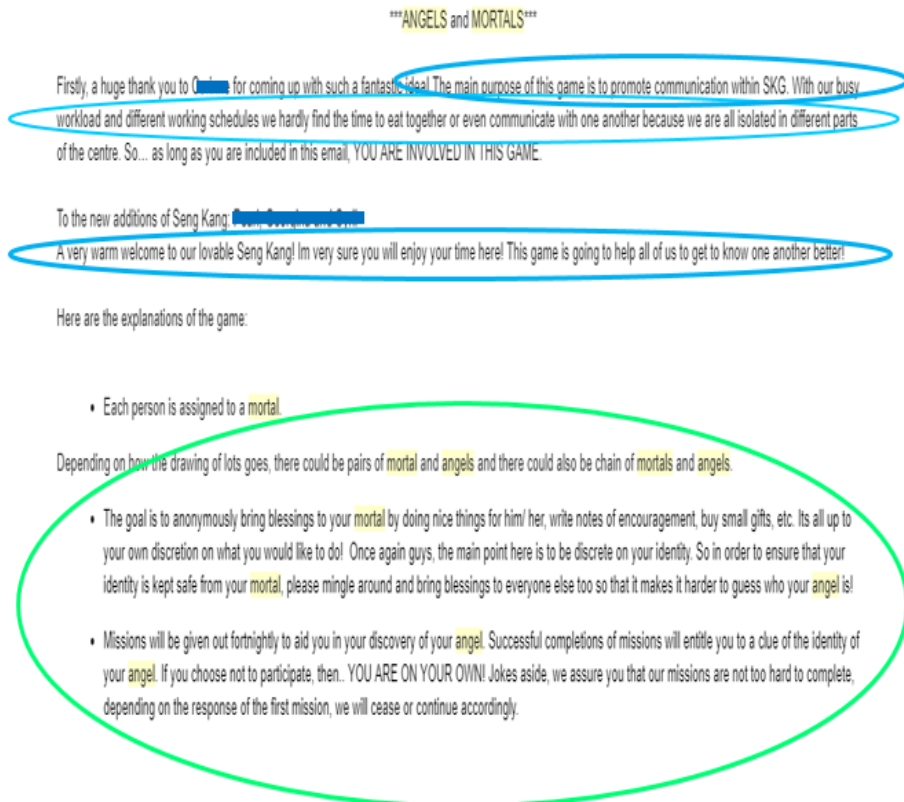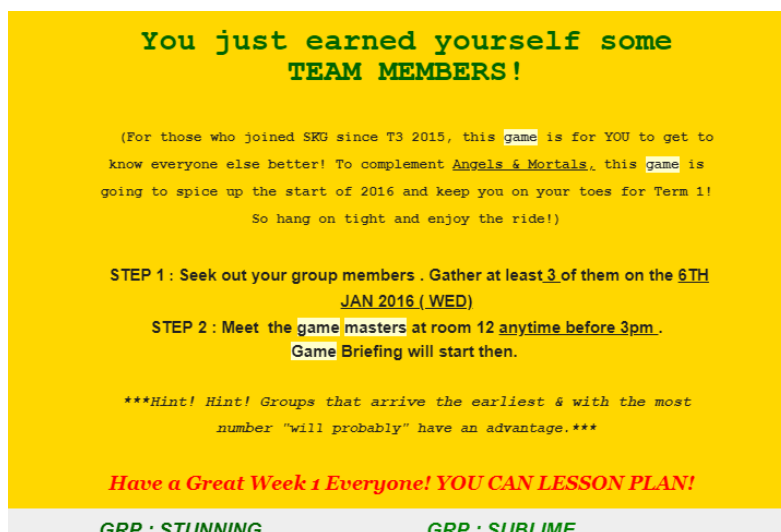
Figure 3. E-mail of initiation of Angels & Mortals game

Figure 4: Mission-based game introduction

RESULTS

Analysis and Findings

Table 2: Identifying mindful elements from the activities the Educational Therapists of learning centre X engaged in.

INITIATIVE	ACTIVITY	OUTCOME	MINDFUL ELEMENT
Mission-Based Games	Attached to a particular colleague whom one takes care of and secretly has been assigned another Educational Therapist to	Curiosity and enthusiasm amidst demanding workload.	Attention, Breaking out of habits and patterns of a day-to-day-work routine.
Notes of encouragement	Educational Therapists writing each other notes of encouragement especially during	Looking out for each other besides an assigned buddy	Awareness and conscious choice.
Team Lunches	Educational Therapists gathered for lunch at least once a week.	Fostered stronger bonds and served as a great comfort to new full-time and sessional Educational Therapists.	Mindful eating through sharing food, reminders to take
Collective Decision-Making	Your problem is mine- If one has challenges scheduling a suitable class for students/parents, we sit and discuss and come up with the best possible solution/class for students.	There are fresh perspectives for the solution and team spirit is strengthened. Various strengths of the team prevail too.	Non-judgment, non-identification and conscious choice.
Acts of kindness and empathy	Origami with notes as a form of distraction during stressful terms.	Assurance of a healthy support system	Attention, Awareness and conscious choice.

The Educational Therapists of learning centre X were asked to participate in two surveys by responding with their opinions for three different measures: Happiness, workplace culture and empathy. These three elements are key indicators of this study because they represent the outcome of creativity in the workplace.
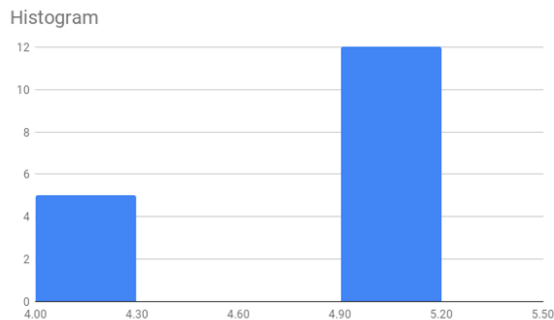

Figure 5: Evaluating the strength of workplace culture at learning centre X.

Figure 6: Level of mindfulness when connecting with colleagues.
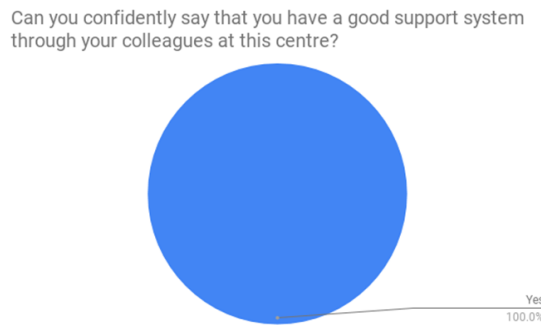

Figure 7: Measure of assurance concerning support system.

Figure 5, represents the strength of learning centre X's workplace culture post the communal activities. The Likert scale between 1-5, where 1 represents the least in strength and 5 being the strongest gauge, was used to measure how the Educational Therapist evaluated learning centre X's culture. 68.8% scored the strength of their workplace culture at '5' is the higher end of the scale and 31.3% scored '4' determining the closest to the highest measure of strength.

In terms of empathy, the culture and contentment being a part of it have sparked the communal and humane essence of empathy amongst the Educational Therapists. It has been identified that the meaningful relationship these Educational Therapists have forged, has encouraged them to be more mindful and aware when communicating with their fellow colleagues. 85% of the Educational Therapists found themselves to have consciously taken the effort to be more mindful when connecting with their colleagues.

When it came to measuring the assurance of a good support system at work post the communal initiatives, all the Educational Therapist of learning centre X recorded that they feel the robust presence of it. This evidently shows how creative and mindful initiatives like gathering for purposeful

activities proved to enhance working experiences and foster meaning relationships. The field of positive relationships at work builds on the positive psychology view that relationships are a central source of life satisfaction, enrichment, development, and personal growth for individuals (Berscheid, 1999; Reis & Gable, 2003; Snyder & Lopez, 2002). It also builds on a positive sociological lens (Baker, Cross, & Wooten, 2003) that suggests that certain patterns of relationships are more generative, enriching, and enhancing than others.
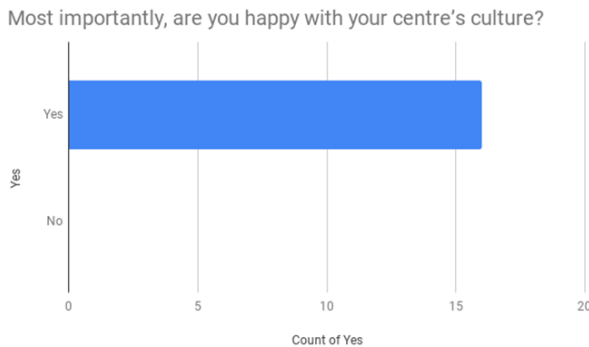

Figure 8. 100% Happiness

Happiness is a strong positive emotion and is a fundamental human experience (Diener and Diener, 1996).

The University of Warwick, UK, in one of their studies revealed that happy workers are up to 12% more productive than unhappy professionals.

They are more likely to be the proud owner of good health, have smooth flowing professional and personal relationships, and prove to be more beneficial for the organisation as a whole.

Delle, Fave and colleagues (2011) noted that happiness is also an ambiguous term which can have a number of meanings:

♦ A transient emotion (that is synonymous with joy)
♦ An experience of fulfilment and accomplishment (characterised by a cognitive evaluation)
♦ A long-term process of meaning-making and identity development through achieving one's potential and the pursuit of subjectively relevant goals.

In view of this, it is clear that the Educational Therapists of learning centre X have understood the transient nature of happiness and that it takes effort, practice and time to build on the sustainability of the emotion by creating conditions that encourage positive activities that bind them as one community. Over time, the communal activities had also helped the Educational Therapists experience meaningful connection in the presence of challenges or an intense term and identify their individual strengths.

Based on the analysis regarding the driving force that motivates the Educational Therapists to connect regularly, it is notable that the people and the positivity that embodies their bond proved to be the recurring responses. This is evident from the clear

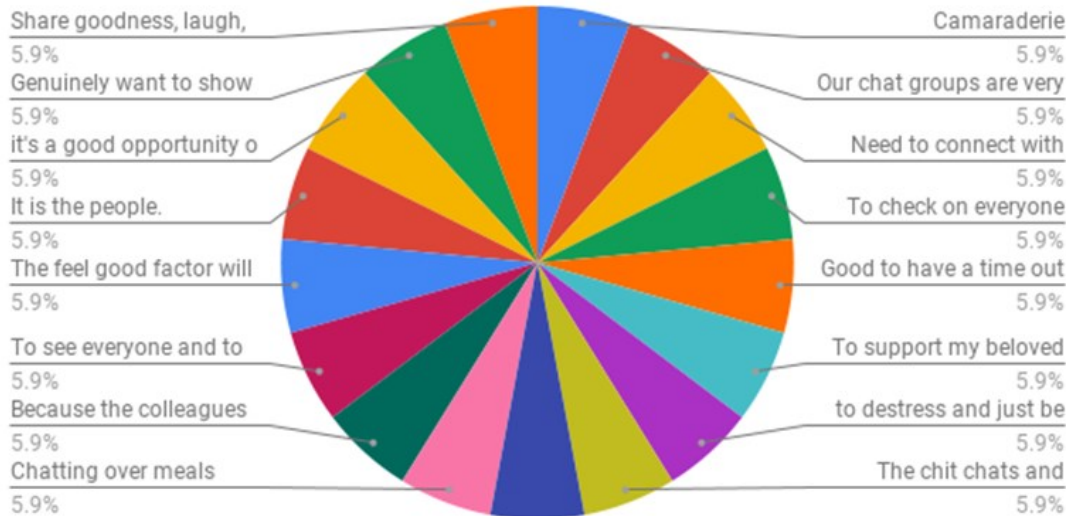## Count of What drives you to make this effort especially on a busy day?

Share goodness, laugh,
5.9%
Genuinely want to show
5.9%
it's a good opportunity o
5.9%
It is the people.
5.9%
The feel good factor will
5.9%

To see everyone and to
5.9%
Because the colleagues
5.9%
Chatting over meals
5.9%

Camaraderie
5.9%
Our chat groups are very
5.9%
Need to connect with
5.9%
To check on everyone
5.9%
Good to have a time out
5.9%

To support my beloved
5.9%
to destress and just be
5.9%
The chit chats and
5.9%

Figure 9: The driving force to make the effort to connect

balance shown in Figure 9 where there is a good spread of answers emphasising these keywords: colleagues, everyone, people, beloved friend, camaraderie, meals, destress, share goodness, laugh, chat, support, check on, time-out and feel-good factor.

The physical environment of a work place affects how employees interact, perform tasks, and are led. Physical environment as an aspect of the work environment have directly affected the human sense and subtly changed interpersonal interactions and thus productivity. A workplace may have the most colourful walls and artefacts, comfortable chairs and stocked up pantries, but it is the warmth of human connection that adds spirit to the place. This is reined in through the culture and patterns of the residents. Moreover, the strong interpersonal relationship between the Educational therapists at centre X show that more than half of the population find the culture to be healthy and nurturing. The accompanying responses lean towards the agreement of this notion respectively.
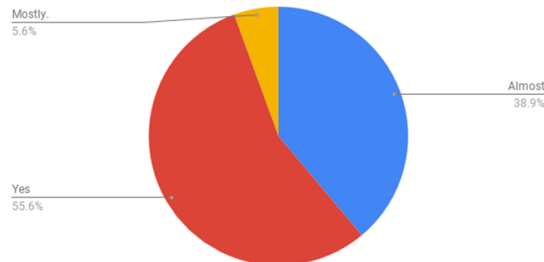

Does your current centre embody a healthy and nurturing workplace culture?

Mostly.
5.6%

Almost
38.9%

Yes
55.6%

Figure 10. Conduciveness of workplace

Colleagues' personal preference

1) Vacation 7.1%

gluten, coffee lovers, 7.1%

How they like their 7.1%

- no onion, 7.1%

Gluten free. Vegans. 7.1%

Many of us enjoy 7.1%

favourite band, snack, 7.1%

can only eat 7.1%

NA 7.1%

1) Whether they like 7.1%

tea over coffee, my 7.1%

Special dietary 7.1%

food diets that 7.1%

stuff'd, honey milk tea 7.1%
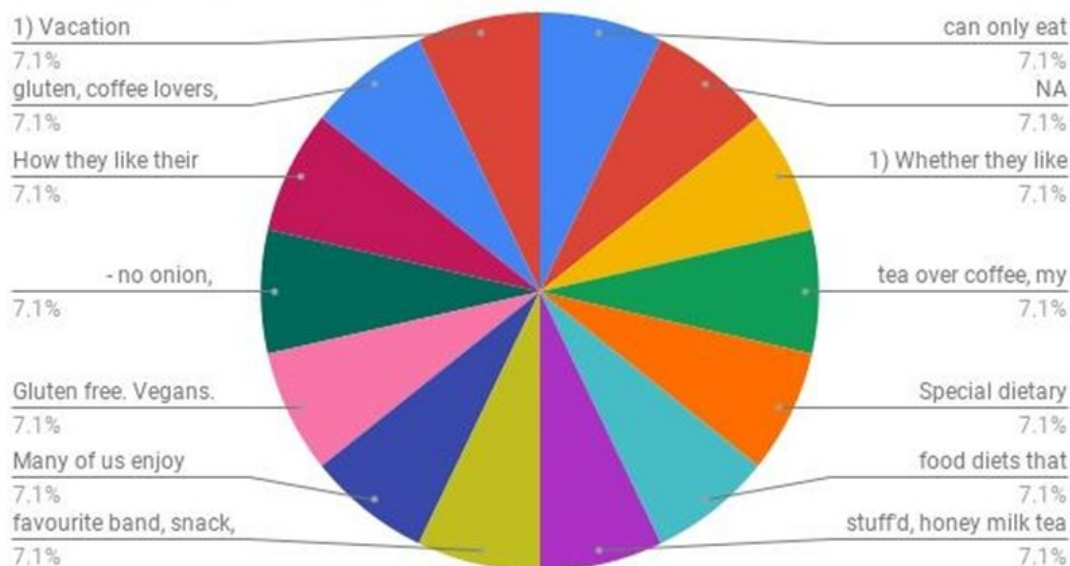
Figure 11. Colleagues' personal preference

Understanding an individual's personal preference defines the amount of respect individuals have for one another. It demonstrates the level of awareness, attention to detail and conscious choices the Educational Therapists at learning centre X possess. It is also notable that these are the core building blocks of mindfulness in an individual. In an age of distraction, it is easy to overlook significant details and rush through our day to day lives. But the essence of learning centre X serves as a lesson to many who rush through their day to day lives and forget to stop and relax to perform better. This balanced distribution suggest that the Educational therapist went the extra mile to observe and take note of their fellow colleague's preferences which either makes or breaks one's day. This was possible from the enriched bond they had developed from engaging in the games at their learning centre. Over time, the responsibility of learning about their designated 'mortal' and 'angel' helped them understand the nature of each other's predilections.

CONCLUSIONS AND IMPLICATIONS:

The intention of this study was to create awareness of how creative and mindful initiatives of gathering for purposeful activities proved to enhance working experiences and camaraderie. In this descriptive case study, we delved into how a particular group of educators from centre 'X' nurtured the culture of including fun at the workplace through meaningful activities like (mission-based games, team bonding, team lunches, meeting to

discuss about student, parents or teaching-related challenges). This picked up based on the trend of one mission-based game initiated to welcome new colleagues into the workplace. It evolved to foster better relationships and refined the workplace culture where these group of Educational Therapists are stationed at predominantly. The main cultural trends in this study included the increase in contemplative team-decision making and how it leads to better productivity, increase in resilience through better support system at work and the nurturing of mindfulness and well-being.

This culture can be adapted at other learning centres and used in various schools and organisations to help their teachers maintain a healthy state of mind and strike a balance between work, play and life- which is vital for teaching, especially for those who are creating meaning for students amidst learning challenges. It is key for nurturing individuals to remain spirited and resilient especially in the special education industry.

This also highlights the importance of workplace culture and environment. Learning centre X ensured that the culture of flourishing through proactively designing a positive and safe environment for one another produced favourable outcomes. Under the umbrella of Positive Psychology, Positive Organisational Psychology strives to recognise motivations, enablers, and effects of the positive organisational patterns, understand how they are facilitated, and why they work in the first place, all in the attempt to find ways to capitalise on their existence. This new lens magnifies a remarkably positive phenomenon in many organisations that leads to the development of employee strengths, fosters resilience, and brings healing and restorative power to the work environment (Positive Psychology, 2019).

Positive Organisational Psychology is the scientific study of positive subjective experiences and traits in the workplace and positive organisations, and its application to improve the effectiveness and quality of life in organisations (Donaldson & Ko, 2010). Ideally, workplace culture supports a positive and productive environment. Happy employees are not necessarily productive employees, and productive employees are not necessarily happy employees. It is important to find aspects of the culture that will support each of these qualities for your employees. Learning centre X bred and found just that through integrating a sense of balance in their day-to-day processes and supported one another without prejudice. These Educational Therapists come from diverse backgrounds culturally, have different personalities, beliefs and educational specialisation. However, it is in the difference that all of them thrived and triumphed to become one community. There was not extravagance or gruelling efforts to make this happen. It all began with the intention of hospitality and acclimatising to one another. It did not deter anyone from their job responsibilities nor did it tire anyone out. It set out to be a reminder that perspectives and perceptions can be changed no matter how demanding work gets. Learning centre X created safe conditions for dialogues and collective work to take place. This also assured the Educational Therapists that they can count on one another and gained a sense of psychological safety in the process.

The limitations that this research might face is that the data collected will be based on surveys and the observer's point of view. Moreover, 1) this study is influenced by a specific group of Educational Therapist within one learning centre who as much as other Educational Therapists, share a fundamental purpose for the craft, are stationed at different learning centres, 2) it is special education teachers specific and may require tailoring when considered for other occupational setting.

However, a well-integrated theoretical framework of educator's well-being is needed, which effectively brings together positive psychology with educational knowledge and pedagogical practice, acknowledges the challenges of change within the educational environment, and stresses the significance of evaluation. Only then can the organisation put forth well-being as the heart of a new approach to education.

NEXT STEPS IN RESEARCH:

This study has greatly inspired me to explore the possibility of awakening and encouraging the essence of mindfulness amongst the educators at our organisation and guide them through identifying their strengths in the process. Having had the opportunity to experience the culture of collectiveness and mindfulness born out of the communal yet adaptable initiatives at learning centre X, it has been proven that mindful elements are present in a range of activities an individual is easily capable of performing on a daily basis. Furthermore, it has also stimulated an effort to design and render CalmEd- a mindfulness-based well-being initiative, as part of enriching this well-being extended to our EdTs.

Having established an understanding from this study on how mindfulness and Positive Psychology efficaciously impacts the euthenics of the Educational Therapists at learning centre X, CalmEd kicked off its pilot project with our board of Educational Advisors to investigate further on how else mindfulness-based approaches can bolster the well-being of educators.

Some of these approaches include sending weekly mindfulness reminders, encouraging deliberate mindfulness practices such as meditation and breathing techniques, conscious communication and even enjoying a nourishing snack mindfully. CalmEd is working towards gradually incorporating mindfulness training into the organisation's ecosystem. The first phase of this 11 months long training, trains Educational Advisors who are in a position to support and guide our Educational Therapists, through guiding them to integrate the five vital mindfulness-based elements: Attention, Awareness, Acceptance, Non-identification, Non-Judgement and Conscious Choice, into their personal and professional lives.

Well-being is a huge concern for both mentors and mentees.

In a way, our Educational Advisors are caregivers. Care translates into interventions that are in the best educational, emotional, and psychological interest of the students (Morgan, 1987). As an Educational Advisor myself, I am responsible to guide and educate educators on educational and administrative processes. Responsibly, as Advisors, it is also imperative in my role to help create opportunities for educators to evolve and grow in their career.

Our Educational Advisors need to be effectively supported through means of well-being initiatives in order to perform optimally and stand as a healthy spokesperson of the Educational Advisory team. The CalmEd mindfulness training for educators trains our Educational Advisors in integral aspects like mentoring, communication, psychological health, classroom approaches and executive functioning skills.

Research has shown that educators are more likely to experience occupational stress that results in occupational burnout (Wisniewski & Gargiulo, 1997). The results of this is usually a rise in teacher attrition. CalmEd aims to promote a positive working environment through Positive Psychology and mindfulness-based principles and help educators improve their overall well-being.

Finally, to drive mindfulness and educational well-being onward, CalmEd will continue to work closely with our Educators, considering how the concepts of positive psychology translates within the intricacies of various educational challenges within the organisation. This will be supported by distinct measurement, which incorporates both quantitative and qualitative data to support program development and evaluation.

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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, Ministry of Education, Kuwait*
- ◆ *Dr Yousuf ALmurtaji, Public Authority for Applied Education & Training, Kuwait*
- ◆ *Shakthi Bavani D/O Sathiasilan, Dyslexia Association of Singapore*
- ◆ *Dr Amanda Denston, University of Canterbury, New Zealand*
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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	Deborah Hewes
DAS Academic Director	Managing Editor
Dyslexia Association of Singapore,	Dyslexia Association of Singapore
Emeritus Professor, Swansea University,	www.das.org.sg/publications/journal
angela@das.org.sg	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 (DAS)

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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