INTERNATIONAL PERSPECTIVES

Dyslexia, Bilingualism and Screening

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In this chapter we shall consider the potential benefits of bilingualism for learning and how these are impacted by dyslexia. Interestingly, for many years there has been controversy over whether children who are bilingual are more efficient and effective learners. Clearly this has strong implications for Singapore, where all children will learn English in school, in combination with their native language that might be Malay, Chinese or one of the Indian languages. Much of the literature shows that in the early years of schooling, this impacts on the speed of acquisition of English, but once the child has reached 10, this early shortfall is easily overcome. On the other hand, children who are multilingual can benefit from an extended period as very young children in which they can access a wide range of sounds, before focusing on the most frequently occurring sounds of their native language, as monolingual children do.

"...for many years there has been controversy over whether children who are bilingual are more efficient and effective learners. Clearly this has strong implications for Singapore..."

Moreover, it seems that their executive skills, such as memory and attention are enhanced by the need to switch between languages, so these strengths may well offset any limitations in language. In comparison with monolingual children, their executive skills are better at age 2, and their memory at age 8 will be superior. So bilingual children are better at inhibition, task switching and working memory, for example in a card switching game for 3-6 year olds, the bilingual group were better able to inhibit incorrect responses, and discard information which was no longer relevant.

This is a major factor in school readiness, and so the benefits of bilingualism may well outweigh the costs in normal development. Bilingual children are more able to co-ordinate visual and auditory information, as well as perform with greater accuracy and speed in non-verbal tasks. Greater complexity in memory tasks produced stronger and faster results for bilingual children, even taking into account low economic status and poor language that usually impair learning outcomes. In fact a meta analysis of 63 studies confirmed this advantage, and ths should give bilingual children an advantage in learning to read (Sandgren and Holmstrom, 2015).

So what about dyslexic children or those with other language impairments? Interestingly, a recent study of card sorting and memory in bilingual and monolingual children with Speech and Language Impairment (SLI) showed that the bilingual children with SLI were less impaired than monolingual children with SLI, showing some degree of protection from bilingualism for this group (Sandgren and Holmstrom, 2015). Support for executive deficits in dyslexia has come from a range of studies, but most have looked at just one aspect in the children studied.

An exception is a recent study from Varvara et al., (2014), who examined a whole range of skills in 8-17 year old dyslexic children and controls. These included verbal phonological and categorical fluency, spoonerisms, visual-spatial and auditory attention, verbal, visual and spatial short-term memory, verbal WM, and visual shifting. Deficits were found in 8-17 year old dyslexics in comparison with controls in all tasks but visual shifting non-verbal errors (Varvara et al., 2014), and spoonerisms and both auditory and visual spatial attention were related to reading. This study confirms the role that executive functions play in dyslexia across the age range.

BILINGUALISM AND DYSLEXIA

Of course, it is more difficult to identify dyslexia in a child who is not a native English speaker, because most screening and diagnostic tests are written in English. Bilingual dyslexic children may be doubly impaired, with a delay in neural commitment related to bilingualism, in addition to delayed neural commitment that can be traced back to their dyslexia. It therefore becomes even more important to put support in place early on, for both language and executive function skills.

In the following section I shall deal first with using screening tests in English and then move on to translation. The tests described here are the DEST, for 4-5-6.5 and the DST-J for 6.5-11.5.

USING SCREENING TESTS IN SINGAPORE

A study by See and Koay (2014), showed that the DEST-II was predictive in identifying Singaporean children at risk for dyslexia, with particular problems identified in rhyming. The preferred test for use currently in providing free screening for children is the computerised COPS test.

DEVELOPING SCREENING TESTS FOR INDIA

The situation for dyslexic children in India has been particularly dire, and there has been little recognition despite sterling work in Mumbai, (MDA, Karande and colleagues) and the Taare Zamen Par film that moved so many people. Dyslexia is not yet legally recognised in India despite a push in this direction in 2011.

Patchy provision has been led by Mumbai with entitlement to provisions in exams since 1996, now applicable between grades 1 to 11. This has led to a 22% improvement in scores in those receiving exam provisions (Kulkarni et al., 2006). There remains a lack of specialist trained teachers and training courses. Following concerns that standards were too high, most dyslexic children are not diagnosed until age 11, although their difficulties have been recognised at age 5.

Because of the stigma still attached to dyslexia and other special needs, most parents will not seek remedial support for their children. There is great anxiety amongst children and mothers over the outcomes for dyslexia, and this has led to a spate of suicides in adolescents newly diagnosed with dyslexia. This was the background against which the DST-J was renormed for India, and greeted with great enthusiasm at the launch in 2012. It is possible to compare the norms for Indian and English children, and this suggests that use of the English norms would be suitable for many countries.

COMPARISON OF INDIA AND UK ON DST-J NORMS IN ENGLISH

Performance of the Indian children is generally comparable or slightly higher than in the UK for all but the vocabulary test, which is slightly lower

Comparable –

- Backwards digit span
- Bead threading
- Verbal and semantic fluency
- Rhyming

Slightly higher or better –

1 minute reading (older groups lower)
Phonological segmentation (younger groups lower)
2 minute spelling
Postural stability (lower score = better performance)

Higher

1 minute writing

Slightly lower

Vocabulary

DYSLEXIA IN WALES

Welsh is now considered a key language for development in Wales, and many parents prefer their child to attend a Welsh speaking school, although they themselves may only be English speakers. There are no reliable statistics available on the number of dyslexic children in Welsh cluster schools. PLASC 2014 identified 6400 Welsh 1st language pupils in Primary (1816 ALN) but this is not including children with Welsh as a second language in Welsh medium schools.

The problem is that there are very few Welsh language screening tests to identify children at risk. The solution here was to develop accredited tests for the Welsh language – in this case the DST-J W. The Welsh National Reading (2013) test has filled a need to measure progress, but more resources are still needed.

In terms of the outcomes from Welsh speaking schools, the Estyn (2009) report identified particular problems in Welsh language schools for oracy in 75% of Welsh second language pupils. Despite recent improvements 'Pupils are making excellent progress in acquiring Welsh second language skills in fewer than one in ten primary schools' (Hill, 2013). There can be an initial advantage for young children in learning to read in Welsh, which is more transparent and regular than English (Spencer and Hanley, 2003;2004). But spoken vocabulary is key to good reading - so the Estyn report is particularly worrying for second language learners in Welsh medium schools.

Considerable care was taken in the translation and adaption of the DST-J to form the DST-JW, a screening test that was launched in October 2015 in Cardiff. The significance of the test for Welsh speakers was evident from the launch in the National Assembly of Wales, the Welsh parliament building.

RISK LEVELS FOR THE WELSH STUDY

Home Language	Mild Risk	Strong Risk
English	34	65
Mixed Welsh and English	5	6
Welsh	17	9
English / Polish	0	2

Over 400 children were screened for norms, and 66.6% of these had English as a home language. We found 29% risk level overall, with 14.4% risk in Welsh first language pupils, with only 3% of these strong risk. Interestingly, by age 9.6 of 50% of the cohort had Welsh as a first language and differences between the language groups have evened out. This is in line with the literature.

In comparison with English norms, Welsh speaking children are 30-40 seconds longer overall for rapid naming, a finding based on the length of Welsh words. This was also evident in slower writing up to age 8.6.

There are a number of benefits of the Welsh language

- Reading more fluent (up to 26 words per minute faster in top achievers)
- Spelling slightly more fluent
- Nonsense reading also slightly more fluent

All of these again are as predicted from the literature.

We calculated separate norms for the native Welsh speakers, because the literature suggested that skills might be lower in children whose parents do not speak Welsh and do not have practice at home:

- Naming speed faster for native Welsh speakers up to age 8.6
- Strikingly Vocabulary scores at 6.6 for this group are equal to the overall group at 9.6 – shows gap for English native speakers
- Wider range of reading skills in younger children at both top and bottom end and advantages in most sub-tests

We now have tools for screening children learning in Welsh medium schools. This allows teachers to identify children with risk of ALN. The profile provides information on the pattern of strengths and weaknesses. The data shows that early vocabulary support is necessary for English speakers attending Welsh medium schools. Wales Dyslexia plan to translate and adapt the DEST-2 and DST-S to cover the age range with permission from Pearson.

BUILDING ON THE POTENTIAL OF SCREENING

In Pembrokeshire, I am working with Nichola Jones to screen and intervene with children at risk in reception, a free structured intervention linked to the screening is delivered by teachers for 1 hour weekly sessions for 1 term in small groups in three 20 minute sessions in 60 schools. Exciting results from 450 children show 91% improve their risk scores, and 83% are no longer at risk!

In Bridgend this has transferred to reading for 75% of the children on the National reading test at 7. This model is planned for Welsh medium children with the DEST-2 to address vocabulary and early predictors.

DYSLEXIA IN MALAYSIA

The work in Malaysia has been led by Dr Sharanjeet Kaur, from Universiti Kengbansaan, Malaysia, who has translated and adapted the DST-J for use in Bahas Malay. Dr Kaur is currently translating the DEST-II and spear heading the research and norm collection for Malaysia.

Data has already been collected on over 500 5-year-olds, to establish whether or not the test is valid for Malaysia, with all of the tests proving valid. Similarly to the UK test, around 15% of children were identified to be at risk. In addition to the DSTM, measures of visual and auditory perception were collected, as well as language and literacy measures and internalising and externalising features in the target group and controls. This is consistent with findings of lowered self esteem in the dyslexic group and relates to whether they blame themselves or the difficulty of the work for their failure.

CONCLUSIONS

The issues of bilingualism and dyslexia have been largely neglected in the literature, although this is being to some extent addressed by recent publications in the Asia Pacific Journal of Developmental Differences. A new book in the area, Multilingualism, Literacy and Dyslexia: Breaking down barriers for Educators' edited by Lindsay Peer and Gavin Reid, will be published in 2016, from Routledge

Publishers including a number of chapters on this issue.

Screening tests have great potential in identifying deficits in this group of learners, particularly when they are translated into the language that children are learning in school. DAS provides a number of specialist services tackling these issues, including their Chinese language programme, and are continuing to focus on the area of multilingualism in their future plans.

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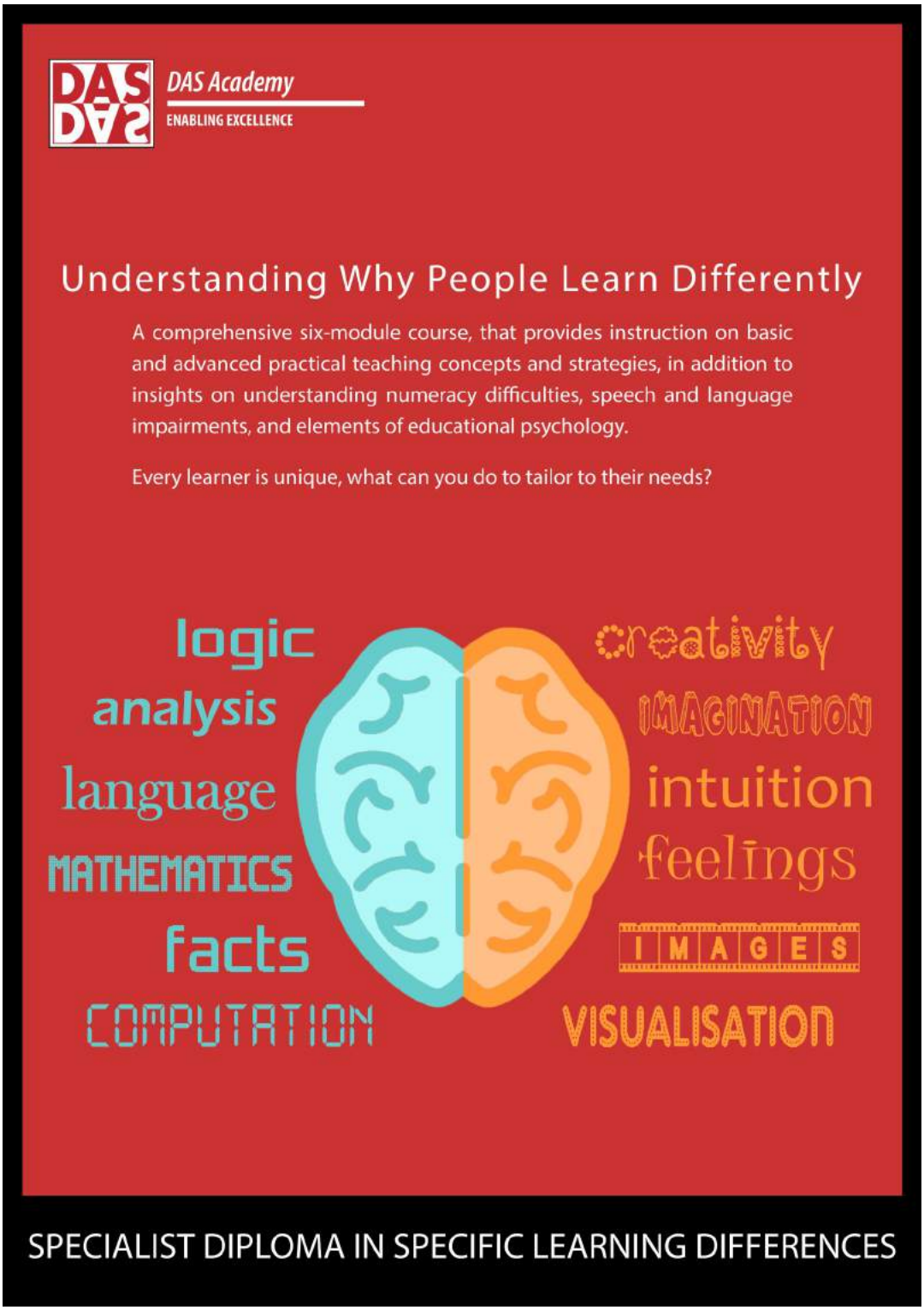
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Dyslexia, and Co-occurring Difficulties

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ADHD – ATTENTION DEFICIT HYPERACTIVITY DISORDER
A term used to describe children who exhibit inattentive and/or hyperactive and impulsive behaviour more frequently and to a greater degree of severity than their peers.

DCD – DEVELOPMENTAL COORDINATION DISORDER
A disorder characterised by movement difficulties that are out of line with age and developmental stage, that are not explained by neurological deficits, and significantly interferes with a child's academic achievement or activities of daily living. (In the UK this is often also referred to as Dyspraxia)

SLI – SPECIFIC LANGUAGE IMPAIRMENT
A disorder in which oral language skills are impaired, but non-verbal ability is within the normal range.

DYSGRAPHIA
A term used to describe writing skills that are substantially below those expected given a person's age, intelligence, and education. This is a subset of difficulties typically assumed to be a component of dyslexia.

DYSCALCULIA
Difficulty which affects the ability to acquire arithmetical skills, despite sufficient intellectual ability and motivation.

Adapted from Research into dyslexia provision in Wales, 2013

The definition of dyslexia identifies a number of potentially co-occurring difficulties, known as co-morbidity. Most children with Specific Language Impairment (SLI) go on to show signs of dyslexia, there's a high overlap between dyslexia and inattention, there's an overlap between dyslexia and developmental coordination disorder (DCD/dyspraxia), and of course there's a high overlap (in terms of reading difficulty) between dyslexia and general learning impairment.

Many practitioners lament that the diagnosis you get seems to depend more on who tests you and when than your actual ability profile. Take dyspraxia for example, previously known as 'clumsy child syndrome'. The definitions of dyspraxia and dyslexia seem almost interchangeable, but for dyspraxia you may have a reading disorder, and of course for dyslexia you must have a reading disorder.

Consequently, evidence from research studies (O'Hare and Khalid, 2002) shows a high overlap, with 70% of children with DCD also showing evidence of dyslexia and phonological problems, and Iversen et al., (2005) showing that 60% of dyslexic children also showed evidence of DCD. Moreover, Haslum and Miles, (2007), showed that children drawn from the National Cohort study of 1970, showed more evidence of dyslexia in relation to a higher number of motor skill deficits. This fits in well with research from the Sheffield group, Nicolson and Fawcett (2004), that showed evidence for motor skill deficits in dyslexia across the age range from 8-17.

Handwriting difficulties or dysgraphia are known to be associated with dyslexia, but there is surprisingly little research into this aspect (Berninger et al., 2008). However, the most compelling evidence is drawn from the Finnish family studies (Viholainen et al., 2006) that show evidence for motor difficulties pre-school in children who are later diagnosed as dyslexic.

In terms of the individual deficits associated with dyslexia, Attention Deficit Hyperactivity Disorder (ADHD) is one of the most interesting, and with recent modifications to the US Diagnostic Statistical Manual (DSM–V) classification system, we are likely to find many more children with dyslexia diagnosed with Attention Deficit Disorder, via a version of ADHD without the hyperactivity which is associated with inattention. These changes will allow ADD to be identified in children based on evidence of inattention up to 12, whereas in the past it was evidence of inattention prior to age 7, and a range of severity will be introduced.

As many of the questions on which a diagnosis is based include slowness and difficulty in completing school-work, many more dyslexic children are likely to be included. This may be secondary to their dyslexia, but clearly a different approach is needed in teaching these children to ensure they remain on task. Evidence can be found in both clinical samples and samples drawn from the general population.

Willcutt and colleagues in 2007 showed that 40% of a sample of twins with either Reading Disorder (RD) or ADHD was co-morbid for the other disorder. 54% of children with ADHD in a clinical sample showed reading problems (Stevenson et al., 2005). Interestingly, in a school based study (Kadesjo and Gillberg, 2005), 40% of children with ADHD showed reading problems and 29% writing problems. It seems that children with both ADHD and RD show a distinctive deficit in rapid naming speed, so it may be that processing speed underlies the link (Bental and Tirosh, 2007). Research now is looking at different aspects of attention and learning in children with dyslexia, in order to understand these areas of processing more clearly.

There is a commonality between some aspects of Specific Language Impairment (SLI) and dyslexia, so it is hardly surprising that most children with SLI go on to show the type of dyslexia associated with poor language development. Much of our early reading is based on guesswork, knowing what words might fit into the sentence you are reading, and clearly the more fluent your language, the more likely you are to be successful. Reports of the prevalence of dyslexia in cases of early language impairment range from 25-90% (Tomblin et al., 2000). Snowling, Bishop and Stophard (2000), checked on the reading and phonological skills of children with preschool diagnoses of SLI, and found significant impairments for these children at age 15. Interestingly, in her family studies, Snowling and colleagues (Muter and Snowling, 2009), have shown that vocabulary knowledge can be a protective factor for children with phonological difficulties, which seems to prevent the development of dyslexia.

Visual processing deficits in dyslexia have been found in two thirds of children attending the Oxford Visual Processing Labs run by John Stein and his colleagues. (e.g. Stein and Walsh, 1997). They note that many children experience symptoms of blurring when trying to maintain their focus in reading. It has been suggested that many children will be helped by using a coloured overlay to soften the glare from the paper, and this includes children who experience migraine as well as those who are dyslexic. The proportion of dyslexic children experiencing symptoms within the general population may well be lower than those identified in clinic, nevertheless, it can be an important contributor to dyslexic type difficulties.

> "Many practitioners lament that the diagnosis you get seems to depend more on who tests you and when than your actual ability profile."

Some children and adults with dyslexia may also experience dyscalculia, a specific difficulty with Maths, and not simply in reading and interpreting the instructions. The leading researcher in the area,

Brian Butterworth (2003), reports that 40% of dyslexics have difficulties with mathematics, although only 7.6% of children with dyscalculia also show poor reading (Dirks et al., 2008). This bears out the early work from Tim Miles in his 1983 book which identified problems with subtraction, multiplication, division, times tables and other aspects of maths. Problems may include mixing up symbols, and problems in the direction of working out sums, as well as understanding written questions. This may be based on phonological difficulties in accessing problems (Simmons and Singleton, 2008) or may be separate cognitive profiles (Landerl et al., 2009).

A smaller number of children may experience Asperger's type symptoms in addition to their dyslexia, and this has been linked to SLI. But a more common problem for children with dyslexia is misinterpretation of spoken language, which can also manifest itself in comprehension. This may impact on the social skills of the child who has difficulty interpreting jokes. A research study which pinpointed difficulties of this type in dyslexic students, (Griffiths, 2007), showed they were impaired in making inferences from a story and choosing the right punch-line for a joke. This of course can have implications for written language and examinations under stress, as well as for a range of social interactions. Similar difficulties in non-verbal skills may be found, for example for my son Matthew, (a verbally able boy) in identifying when a social situation changes gear, and so missing subtle non-verbal cues and getting hurt in the playground.

So there is clear evidence for a range of overlapping difficulties in dyslexia, as outlined above But it seems that it may be even more common to find an overlap between several different overlapping disorders and dyslexia. A high overlap between symptoms of different developmental disorders has been identified in a number of studies (e.g. Bishop, 2002; Gilger & Kaplan, 2001; Jongmans et al., 2003). There is an international consensus on this overlap. Studies from Canada, the UK, USA and Scandinavia all show how hard it is provide an unequivocal diagnosis, leading to the quote (from Kaplan and her colleagues, 2001). "in developmental disorders co-morbidity is the rule not the exception'.

This analysis highlights the importance of secondary symptoms in distinguishing different causes (and the problem in basing diagnostic procedures on behavioural symptoms). Kaplan et al., (2001) studied a population-based sample of 179 children receiving special support in Calgary: If the children met the dyslexia criteria, there was a 51.6% chance of having another disorder. If the children met the ADHD criteria there was an 80.4% chance of having another disorder.

Studies from our the Sheffield research group have identified motor and speed difficulties in dyslexia, in addition to their literacy and phonological difficulties, and this applies not just at the group level, but at the level of individuals, with over 80%

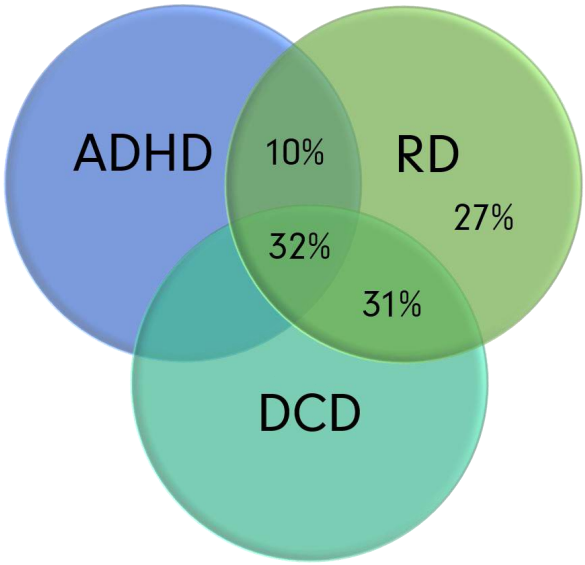

Figure 1. Overlaps between developmental disorders (Kaplan et al., 2001)

of our panel showing deficits in all of these areas in a series of studies addressing a broad range of areas.

Interestingly this approach has now been taken up by other research groups, (e.g. Ramus et al., 2003) and has considerable potential for identifying overlaps and providing appropriate support. This approach led us to consider the brain regions which might be involved in dyslexia and to focus on the cerebellum, which gives a good explanation for a range of difficulties, including problems in automaticity, speed of processing, and phonology, all learned skills (Nicolson, Fawcett and Dean, 2001).

Most recently, Snowling and colleagues (Gooch et al., 2014) have identified deficits in children with family risk for dyslexia. The authors note that co-morbidity can be seen in the preschool years: children at family risk were weaker than typically developing children in motor skills and executive function, and this particularly significant for those with language impairment. Children's early language and motor skills are predictors of children's later reading skills.

In terms of Singapore, the Specialised Educational Services (SES) programmes developed by the Dyslexia Association of Singapore (DAS), are based on the recognition that for most children their dyslexic problems are compounded by other issues, including those such as low self esteem, that may be a consequence of dyslexia and difficulties in keeping pace with their peers.

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FOR FURTHER INFORMATION

http://www.bdadyslexia.org.uk/about-dyslexia/schools-colleges-and-universities/what-are-specific-learning-difficulties.html
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http://www.dyslexia.ie/information/general-information-about-dyslexia/co-occurring-conditions/

For further information on research into dyslexia provision in Wales
http://wales.gov.uk/statistics-and-research/research-dyslexia-provision/?lang=en

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Angela has worked with the Dyslexia Association of Singapore for a number of years and is currently a Research Consultant to DAS. She is currently the Editor-in-Chief of the Asian Pacific Journal of Developmental Differences.

Rhythm, Tempo and Enhanced Academic Performance

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Member of Professional Association of Tutors of Students With Specific Learning Difficulties

KEY WORDS

RHYTHM
A strong, regular repeated pattern of movement or sound.

TEMPO
The rate or speed of motion or activity; pace.

NEUROMOTOR IMMATURITY
The retention of immature patterns of movement control.

EXECUTIVE FUNCTION PROCESSES
These include: planning, organising, prioritising, and working memory.

EMBODIED COGNITION
A concept that proposes that the brain's systems of understanding are rooted in bodily awareness.

In this article I would like to draw the reader's attention to research and practice in the use of physical, rhythmic movement programmes as part of interventions to improve literacy skills. This draws on the work of practitioners internationally, including Dr Elizabeth McClelland of Oxford University in the U.K. and Professor Crispiani of The University of Macerata in Italy.

I have been researching this field since 2005, and have trained in a number of approaches, in order to evaluate their effectiveness both in terms of the research available and to explore the ethics and practicality of using academic time for, it can be argued, non-academic purposes.

The programmes referred to in this article are primarily aimed at students aged 4 and above whose academic progress is causing concern. They share an understanding that exercise does not replace systematic phonological training, rather it harnesses the research on embodied cognition where the hypothesis is that improving attention and self-control through physical and visual bodily activities and auditory tasks can lead to enhance academic attainment.

'Schools still largely regard the mind and the body as two distinct things, with teaching designed to train only the mind. However, recent developments in cognitive science suggest that there is much more to thinking and learning than previously supposed... and has given rise to a radically different model of how the human brain thinks and learns. In the 'embodied cognition' model, the body and brain work together in an inextricably linked brain-body system' (McClelland, 2015).

Instead of having to represent knowledge about the world and using that knowledge to simply output commands, the brain is, according to this theory, part of a broader system that critically involves perception and action as well. Higher-level learning is seen as grounded in sensory awareness, which needs to be trained as a foundation for the development of higher-level learning. Thus programmes that require attention, inner focus, self-direction and physical coordination are being researched to establish whether they produce long-term and sustained improvements in academic performance.

The concept of using physical approaches to improving classroom performance has a long history, from the benefits of exercise to bringing improvements in overall health to more specific claims for improving cognition and behaviour. More recently the practice of relaxation exercises and mindfulness has re-focused attention on teaching students how to pay more attention to how they experience stress and emotions in their bodies.

Teachers in the UK, for example, have, over the years, been encouraged to integrate physical activities into their timetable, but the theory and research underpinning this type of approach has not been particularly extensive.

"Teachers in the UK have, over the years, been encouraged to integrate physical activities into their timetable..."

Usha Goswami of the Centre for Neuroscience in

Education at the University of Cambridge in the UK, has written about the potential associations between music and dyslexia and in the perception of rhythm. She cites a study involving pre-school children in Germany that found significant links between rhythm training and phonological awareness. The training took place for 10 minutes daily over a period of 20 weeks. It included joint drumming, rhythmic exercises and dancing.

The outcome suggested that the group showed significant gains in phonological awareness. Several further examples are provided to offer 'strong support' for a link between musical rhythm perception and reading in 10-year old children with and without a diagnosis of dyslexia.

Scientists have shows that good rhythmic abilities are closely linked to good phoneme awareness and fluent reading. Dyslexic children often have poor ability to clap to a rhythmic beat and children's phonological awareness and reading ability can be improved by regular rhythmic exercises. Brain scans show that listening to music with a highly rhythmic melody actually helps the brain to organise other incoming information and improves attention.

The underlying link between rhythm and literacy is that it is essential to be able to hear the rhythm in speech before progressing to phonemic awareness and reading. Furthermore, it has been suggested that young infants need to learn tightly timed, rhythmically organised body movements in order to provide the underpinning foundations for the development of language.

The role of tempo, the rate or speed of the physical movements, is an interesting area that I intend to explore further in future publications in terms of the following programmes:

- The Crispiani Method: Professor Crispiani
- Move4Words: Developed by Dr Elizabeth McClelland
- Move To Learn: Barbara Pheloung

Each of these programmes aims to improve literacy skills and executive function through a daily set of physical movements that operate within the context of embodied cognition. All three programmes have been developed as a means to address those students whose literacy skills are cause for concern, and all share an approach that is rhythmic, although the tempo varies.

So how can physical, movement-based activities with rolling on the floor, bouncing balls, marching and cross lateral activities influence literacy skills and executive functioning?

What these programmes share is the structured development of:

- Visual attention and eye tracking skills
- Training in developing focused, precise, rhythmic movement
- Short daily (or regular) input for whole class or more specialist groups/ individuals
- Spatial awareness and a mindful awareness of physical sensations
- The use of varying tempo in relation to the activity
- The role of the teacher/ clinician as a support, enabling the children to plan their physical actions and effectively to teach themselves the sequences.

By working on these foundations for learning, the programmes appear to recalibrate brain-body interaction through addressing neuromotor immaturities. There is a growing body of evidence that physical activity interventions do have a positive impact on academic performance. Tomporowski, Lambourne and Okumura (2011), carried out a large review of evidence to date, and found significant impact of physical activity and exercise on children's intellectual function, cognitive abilities and academic achievement.

There are also some indications that physical activity performed in the classroom may have a greater impact on academic achievement than exercise done outside/ in other settings (Donnelly and Lambourne, 2011). McClelland (2015) also makes reference to research in the links between students' phonological awareness and reading and participation in rhythmic exercise.

'Received wisdom would say that the only thing which will improve reading skills in children with SEN is literacy teaching. However, recent developments in cognitive science suggest that it may be time to reconsider this perspective... The underlying link between rhythm and literacy is that it is essential to be able to hear the rhythm in speech before progressing to phonemic awareness and reading.

The effect of poor rhythmic ability is to produce an experience of spoken language for a child, which is similar to listening to a non-native speaker speaking your language with the stresses in the wrong places. ' (McClelland, 2015)

WHAT IS THE EVIDENCE?

Crispiani's programme can be seen as the most intensive, with sessions taking place on a 1:1 basis with a specialist trained practitioner, unlike the other two programmes. The method involves the student in 3 x 1 hour sessions per week for a 12-week period, using highly structured rhythmic activities at a fast tempo. Each session is physically demanding. Professor Crispiani has published extensively and his work is now beginning to be translated into English. The Crispiani Method conceives of Dyslexia as a disorder of timing and the intervention addresses this systematically.

His method is in use extensively across Italy and is linked to the training of teachers in the recognition of dyslexia and methods of support.

McClelland's findings and longitudinal data indicate that the exercise programme schools used 'had significantly enhanced academic performance levels' compared to pupils who did not use the intervention, which lasted for a 12-week period. Activities developed in complexity, being delivered in short, highly prescriptive video segments. The tempo of these movements was moderate, with an emphasis on paying attention to physical sensations. The activities take place either seated or standing and the teacher is expected to participate as the class follow the moves on screen.

In the article written by McClelland, Pitt and Stein (2015), the authors describe pilot trials which they claim were very successful in terms of the impact for pupils performing below the 20th percentile in literacy assessments, although higher achieving pupils also achieved smaller, but still significant improvements. These improvements were long lasting and were achieved within an inclusive context, with all pupils participating. In terms of practicality, this is seen as a low-cost addition to school provision that can be justified over the time spent.

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Pheloung has published several books about the Move To Learn approach and research has been carried out in Poland, South Africa and Australia. Move to Learn

is unlike the other two programmes in that it is primarily floor based and comes from a joint perspective of learning differences and occupational therapy. The exercises are performed very slowly and with a stress on rhythmic precision. Move to Learn is used in mainstream classrooms and it is an inclusive programme 'aimed at addressing some of the functional deficits that are commonly present in children with various learning differences. Sequenced to follow the natural stages of human development experienced by children in the preschool years, the program is designed to increase learning readiness.' (Pheloung, 2014)

The evidence suggests that the students who participate in the year long programme make improvements in terms of executive functions, behaviour and focus in the classroom. More research is needed to establish more precisely the extent of improvement across specific skills and whether the gains are long-term.

FINAL POINTS

This continues to be a fascinating debate and I have seen interest grow in the relationship between the physical and cognitive dimensions of learning. The programmes described here suggest that working with the body offers a valuable tool to improve cognitive functioning in a very broad sense. The key concepts of tempo and rhythm would benefit from a greater analysis and I am currently working with the creators of all three programmes to explore this in greater depth.

My understanding is that the programmes develop the pre-requisites for learning more effectively and remove some subtle barriers to classroom performance. Whereas Move 4Words has the most data on literacy improvements, Move to Learn appears to produce more developmentally age appropriate skills and processing. The Crispiani Method shares many similarities, but is a more specialist approach for students with dyslexia. In learning more about this method, it will be interesting to see how much overlap there is between the three programmes and to make recommendations for a structure which incorporates the most effective elements for use in schools.

We know there are many students who do not access the support they need for undiagnosed dyslexic difficulties. There are also many students whose literacy skills are failing them, but who do not necessarily meet the criteria for a specialist intervention. My goal is to provide mainstream schools with a programme that can begin to produce a greater impact on these students within an inclusive, ethical and cost-effective paradigm.

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The Importance of Early Intervention: A Review

Emeritus Professor Angela Fawcett
Research Consultant
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This article was originally published in the DAS Handbook of Early Intervention 2015

The issue of what age is best to intervene to provide support for children with dyslexia or at risk of dyslexia has been a fruitful topic for some years now. In this review we draw together material from a range of sources. We include the review (Fawcett, 2002) for the UK Department of Education, the findings of the US National Reading panel; Greg Brooks (UK) 2002, 2007 and 2013 papers 'What works for pupils with literacy problems', Chris Singleton's (UK) 2009 review of interventions for the Rose Report; and recommendations from the 'What works Clearinghouse', Robert Slavin's (US) 2009 systematic review of US interventions, as well as a systematic review of the current literature. We have also included an updated search for research by Joe Torgesen, who is a key figure in US intervention research (Torgesen et al., 2014).

Our conclusions are that early intervention is the most effective and cost effective in terms of reaching a child's potential and reducing the impact of failure on their self-esteem.

WHAT ARE OUR CRITERIA FOR INCLUSION?

It is important to note that we started with stringent criteria for what we would accept and planned to include only studies undertaken with children with diagnoses of dyslexia or language disability, which would meet the 'gold standard' of randomised controlled studies including pre and post tests with standardised tests. However, this would exclude studies which aim to prevent failure with 'at risk' children prior

"...early intervention is the most effective and cost effective in terms of reaching a child's potential and reducing the impact of failure on their self-esteem. ."

to diagnosis at age 8. This would be in line with the Rose report (2009) that moves away from early screening and intervention in years 1 and 2 to focus on children with known difficulties.

Nevertheless, many of the most successful studies are conducted at any early age, before formal diagnosis has taken place. We will also try to keep to rigorous standards for the studies presented, all of which will have been published in a peer-reviewed journal, apart from the recent report on 'No to failure' that is included for information on the difficulties which can be experienced working in an educational setting, even for those who are experts in the field.

For a review of the issues in designing intervention studies, see Haslum (2007), who notes that it may not be possible or desirable to adopt the gold standard randomised controlled double blind study in educational research.

THE REVIEWS

It should be noted that although these reviews are comprehensive and well received, none are peer reviewed and published in journal form.

Note here that the impact of interventions is usually measured by effect size analyses (ES) (Cohen, 1969) that suggest an effect size of 0.20 is small, 0.5 is medium and 0.8 is large.

i) Slavin (2009)

These reviews taken from the website Best evidence encyclopedia examine the impact of different reading approaches with beginning and struggling readers, and include interventions of 12 weeks or longer which represents strong medium or weak evidence, with effect sizes of at least 0.20.

The method is known as Best evidence synthesis, and uses well-justified standards to evaluate studies and pool effects, in an approach similar to the What works clearinghouse. Slavin included 96 quasi experimental-control comparisons, 39 of which were randomised and five quasi experimental.

ii) Singleton (2009)

Singleton notes that there is a dearth of well-controlled studies with children with known difficulties, and acknowledges the need to recognise 'silver standard' studies using quasi- experimental designs including pre and post

tests, some of which may not include controls. Singleton (2009) has included a large number of unpublished studies presented at conferences or published in book chapters in his review.

iii) **Brooks (2007)**

Brooks has similarly presented unpublished material, more specifically studies that have investigated intervention approaches that he finds promising.

iv) **What works clearinghouse (2007)**

This website maintained by the US department of education includes sections on beginning reading (ages 5-8) and adolescent reading, as well as achievement more generally. This website allows searches for specified interventions, and includes single case studies as well as randomised trials and quasi-experimental studies. (http://ies.ed.gov/ncee/wwc/reports.)

v) **Fawcett (2002)**

This review for the DfES website included an analysis of current publications plus the findings of the US National Reading panel.

vi) **US National Reading Panel.**

It is particularly interesting to cross reference across these reviews and identify strong UK intervention studies which have been highlighted in a range of US and UK reviews.

In 2002, Fawcett (2002) noted that even well evaluated traditional therapies were not proving as successful as had previously been hoped, despite the development of costly long term controlled studies in the US by the National Institute for Child Health and Human Development (NICHD) designed to help children with dyslexia and other reading difficulties costing between 10 and 20 million dollars a year.

The problem is that training leads to improvements in the area which has been trained, but it is much more difficult to ensure that this generalises to reading skill overall.

The most difficult task is to improve children's standard scores in literacy, because these take age into account, and are often based on irregular words that do not

improve with phonological training. Therefore the results from the US National Reading panel (2001) showed improvement in phonological skills, but this did not always generalised into accurate reading, nor typically has this improvement generalised into more fluent reading, and spelling is even more difficult to remediate.

However, there are a number of critical issues that need to be resolved before progress can be evaluated properly, and many of these were addressed in the US analysis. These include:

- What age is likely to be the best to intervene?
- Is it better to allow children 'at risk' to fall behind and then intervene with children with recognised difficulties?
- Are there significant differences between training programmes and what is the best type of training.
- How long should a programme be administered for?
- Is it most effective to give it for weeks or is it necessary to provide a year of intervention?
- Does it matter how intelligent the children are, or can the same approach be used with children of all types?
- What is the significance of a poor start for children from a low socio-economic background?

The approach adopted here is to use the insights from the US research, to combine these with best practice in UK research, and present the evidence within a framework that emphasises not only effectiveness but also cost-effectiveness.

THE BACKGROUND

Although most educationalists would agree that understanding is the key, research in the area has largely focused on the ability to improve single word reading. This is mainly because it is the easiest to measure objectively. There is solid evidence that this can be improved, although typically it is easier to improve skills in a normal reader, or an 'at risk' beginning reader, than it is to help an older disabled child.

The major area of debate here has been which method is the most effective? The major focus of US research has therefore been a series of comparative evaluations of the effectiveness of each method, with a general consensus among researchers that phonological training is likely to be the most effective. This has led to a series of longitudinal studies, spanning 3 years or more, with some programmes of research adopting a 10 year perspective in order to consider long-term outcomes.

The results of these US interventions have, embarrassingly, been somewhat disappointing, with no significant differences between any of the remediation methods evaluated, although phonological approaches are more successful overall. On closer analysis, a general dissatisfaction with the impact of intervention studies led the US government to commission a National Reading panel into reading remediation (2000). For the first time for over a decade, it became clear to policy makers that interventions that target phonological skills alone or even in combination with single word reading may not be enough.

Despite an improvement in these component skills, the reading of disabled readers remained laboured, which impacts on their understanding of what they are trying to read. It was still not clear what could be done to effect change. This change in emphasis prompted the US National Reading panel's critical analysis of the effects of intervention worldwide. This will be augmented with material from ongoing and recently published UK and US research, in an attempt to establish which techniques are most useful. In line with a balanced approach, it should come as no surprise to find that a judicious mix of techniques tuned to the individual needs of the child is the approach that will be advocated by this review.

THE EFFECTS OF INTERVENTION

When considering outcomes from an intervention study, it would be hardly surprising if children improved on the skill they had been directly trained in. However, there may also be evidence of near transfer or far transfer. Near transfer means that there are improvements in skills only indirectly related to the skill trained. Intervention studies seek evidence of far transfer, so that a skill held to be unrelated to the trained skill, is improved. Naturally, this is the most difficult to achieve, and so most studies of phonological intervention look at near transfer to reading, and possibly far transfer to spelling. Note that complementary techniques that are not based on phonological or reading intervention are by definition evaluated on far transfer.

Finally, it is useful to establish that improvements are not just a general Hawthorne effect of the greater interest taken in the child. This means that evidence should be specific to the skill in question, rather than just a generalised improvement (good as this might be!).

Interestingly, phonology and fluency are almost invariably separated in the US literature, but in the UK a more pragmatic approach is normally taken, possibly based on the limited funds available for large-scale research of the type common in the US that evaluates controlled studies Intervention A versus Intervention B.

Note also that educational interventions in the US are highly competitive, each state has their own system and can specify their own intervention packages, and those which are well-evaluated and widely used stand to generate significant amounts of money. Amongst the articles selected for the National reading panel review the following key UK intervention studies were featured; Hatcher Hulme and Ellis, 1994 and Solity (2000). These are discussed below.

WHICH PROGRAMMES WORK BEST?

In Table 1 we present a review of effective studies with the highest effect sizes at the top, split into primary and secondary age studies. It is interesting to note amongst the most successful interventions for the UK are a series of studies from Hatcher and colleagues with an effect size of from 0.69 to 1.6 for a 10/20 hour intervention which delivered a combination of reading and phonology (Hatcher et al., 1994, 2006a and b), and a series of 10 hour phonics and fluency interventions from the Sheffield group (Nicolson et al., 1999; Fawcett et al., 1999, 2000).

These studies with children aged 5-7 were highlighted in Fawcett (2002) in Brooks (2007), and remain amongst the most successful in Singleton 2009 and in the current review. The approach adopted for the Sheffield studies used a scheme known as Interactive assessment and teaching, a photo-copiable scheme by Reason and Boote (1994) recommended by the UK literacy strategy. This approach was based on classic comparisons of intervention and control groups matched on reading age at pre-test, and with intervention in small groups for 20 minute sessions three times weekly.

In more recent studies, Hatcher et al., (2006), have compared the UK Early Literacy Support (ELS) and their 'Sound Linkage' program with 128 six year olds, and found that both schemes produced significant gains in reading and spelling which were maintained at follow-up. The authors note the limitations of this study, in which there was no untreated control group, and allocation to treatment was not random. In a further study (Hatcher et al., 2009b) a randomised controlled trial was undertaken which overcame these limitations, with children working in groups of 3 with a teacher, or individually with a teaching assistant in daily 20 minute sessions.

However, there are also issues of cost-effectiveness to take into account here, based on the amount of teacher input needed to achieve the effect. There can clearly be very different costs and benefits involved in projects of this type!

Even interventions with equivalent effect sizes may not always be directly comparable. The ideal scenario would be an intervention which produced the

Table 1. Summary of Intervention Studies in Decreasing Order of Effect Size, Showing Effect Size of 0.8 or greater

Study	Sample	Effect Size	Source
Solity, et al. (2000)	370	3.5	Brooks, 2007
Juel (1996)	6	3.15	Elbaum, 2000
Nicolson, Fawcett & Nicolson (1999)	16	1.34	Singleton, 2009
Hempenstall (2008)	206	1.22	Slavin, 2009
Ehri et al. (2007)	102	1.08	Slavin 2009
Santa & Hø ien (1999)	49	1.04	Slavin 2009
Brown et al. (2005)	59	1.03	Slavin 2009
Nicolson et al. (1999)	116	0.98 (spelling)	Brooks, 2007
Foorman et al. (1998)	68	0.91	Ehri, 2001
Torgesen, et al. (1997)	65	0.90	Slavin 2009
Ehri et al. (2007)	96	0.89	Slavin 2009
Meier & Invernizzi (2001)	55	0.89	Slavin. 2009
Center, et al. (1995)	56	0.86	Slavin 2009
Morris, Tyner,& Perney (2000)	186	0.86	Slavin. 2009
Blachman et al. 2004	69	0.85	Slavin 2009

maximum benefit at reasonable costs in terms of teacher time, using teachers with no specialist training, the effects of which could be shown to persist after the intervention ends. Interestingly, Hatcher (Hatcher et al., 2006b) found no significant differences between outcomes for children who received either 10 or 20 weeks intervention.

i) **Phonemic awareness training**

What is phonemic awareness training? It is understanding the concept of phonemes (the smallest sounds of spoken language, either single letters or sounds like sh or ch). This is difficult for children to grasp without some explicit instruction, because in speech words are usually co-articulated. This means that the way letters are pronounced is influenced by the sounds before or after, so that it is not easy for children to identify the component sounds.

Phonemic awareness can be measured in a variety of ways. Separating out the first phoneme in a word (c in cat), blending sounds to make the word (c-a-t makes cat), or segmenting sounds within a word (say cat without the c).

When phonemic awareness is measured using letters as well as sounds, it becomes phonics training. Interestingly, the findings on phonemic awareness training from the National Reading panel suggest that it is most effective when combined with letters (**0.67** around twice as effective as without letters), which makes it essentially **phonics** training.

ii) **Phonics training**

When evaluating phonemic and phonics training, the National Reading Panel note that it is important to realise that the development of phonic skills is not an end in itself, but simply provides the tools which a child can use to read more effectively. It seems likely that this has been largely forgotten in the debates on the merits of rival approaches in the US!

APPROACHES USED

i) **Analysis and synthesis.**

Analytic phonics uses the onset (First letter) and rime (rest of the word) - so the onset of cat is c, the rime is 'at'. It also breaks the word down into syllables or segments the word. Synthetic phonics starts with the sounds of the letters and avoids whole words. This is currently the major approach favoured in the UK, but interestingly despite the publicity this approach has received through the work of Rhona Johnston over the last 7 years in Scotland, we could not find published peer reviewed articles by Johnston evaluating this technique.

ii) **Embedded phonics**

This uses phonics as they appear in text. This is not a planned and structured approach like the others, but is based on a more natural experience of reading.

WHAT AGE SHOULD WE INTERVENE?

Strikingly, moreover, there were clear implications from the National Reading panel for special needs from an analysis of the results of phonics intervention on literacy. This was most effective when delivered to 'at risk' preschoolers, with the impact on reading for children with known difficulties declining as the children grow older (grades 2-6, ages 7+), and with no impact on spelling after 1st grade (with an effect size of only **0.09**).

Declining effectiveness for children at junior school level is displayed graphically in the figure below. Studies in the UK have confirmed that younger children are more likely to 'accelerate' to keep pace with their peers than children at junior school level, (Nicolson & Fawcett 1999, Fawcett & Nicolson, 2000) possibly because problems at junior level are based on real difficulties rather than lack of exposure to the skills in question. These results suggest that early identification reflects good practice in the field, and that this approach should be adopted more universally in Singapore and the Asia Pacific region..

Contrast the effect size gains for 'at risk' and normal children in the 1st grade in the figures below, with children with difficulties. Problems are much more intractable, and it is unusual to produce a strong effect size, even with quite intensive support. Indeed, intensive support can prove counterproductive in improving skills, although this may simply reflect the severity of the difficulties experienced by children who are offered this intense support.

In his 2013 review, Brooks adopts a different approach, assessing work in terms of the reading scheme used. Unfortunately, for many of the studies reported, the data to evaluate effect sizes is not available, and ratio gains are reported in preference. Here, exceptional impacts are found for Reading Recovery in year 1, with effect sizes of 1.67, with good but less striking impact in year 3, at 0.84. Catch up Literacy in year 3 shows an effect size of 1.11 and Paired Reading 0.87. Brooks concludes that the majority of effect sizes are between 0 and 1, and anything exceeding this level is very strong impact indeed.

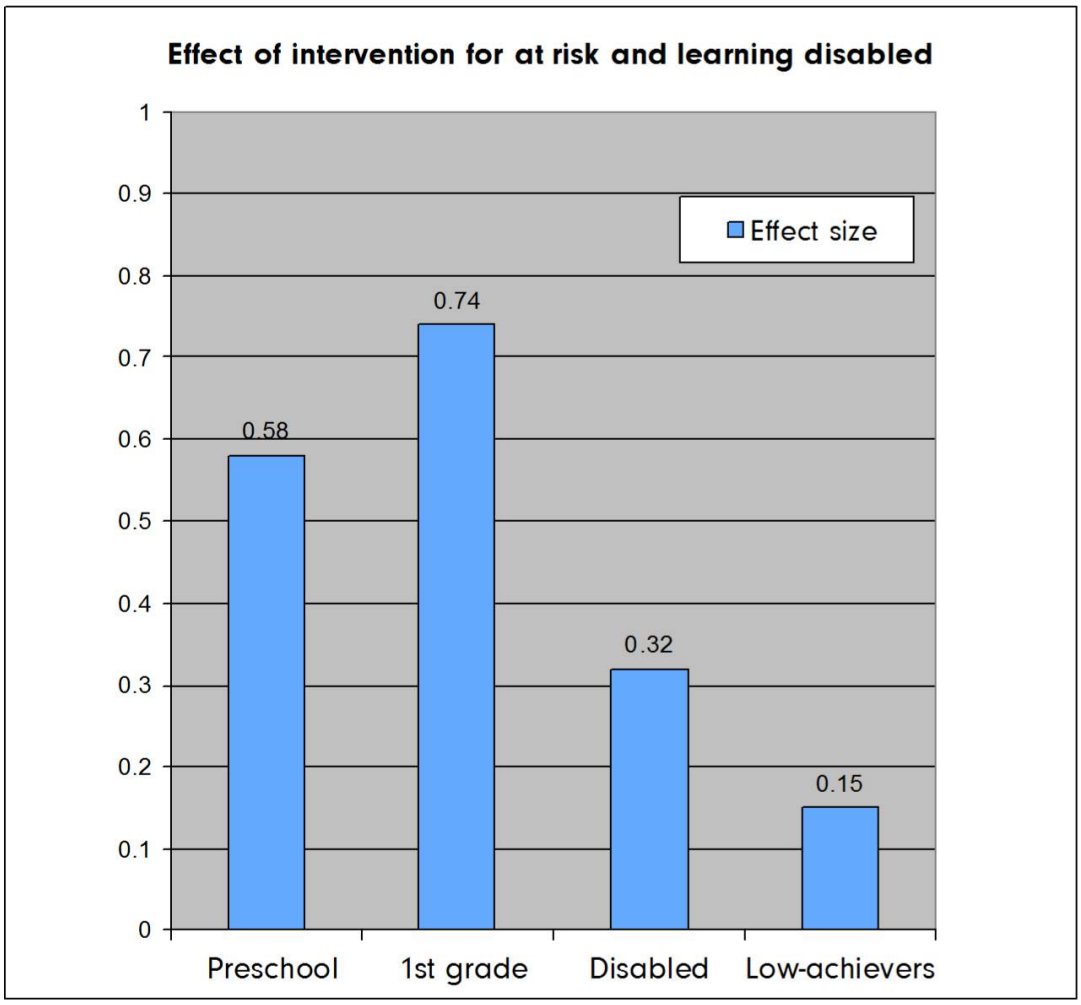

Figure 1. Phonics intervention is most effective for reading in 1st grade and less effective for older children (data from the National Reading Panel).

FLUENCY

This aspect of reading has largely been overlooked for some years, with the emphasis being placed on training in phonics and phonology. The idea that you need to become automatic in skills in order to free resources has been known since the 1970's, but not necessarily recognised in the context of reading. The idea that this analysis should be applied to reading was an important conclusion of a recent influential overview and analysis of the teaching of reading: " ... Laboratory research indicates that the most critical factor beneath fluent word reading is the ability to recognise letters, spelling patterns, and whole words effortlessly, automatically and

visually. The central goal of all reading instruction - comprehension - depends critically on this ability." (Adams, 1990, p. 54).

This issue has now been universally recognised as important in the US, following a report (Pinnell et al., 1995), from the National Assessment of Educational Progress, which showed that 44% of 4th graders (9/10 year olds) were not fluent even with material appropriate for grade level that they had already read in class. These students may find it difficult to understand what they read.

It is clear that fluency develops with practice, but what is the best kind of practice? If poor readers are considered, they naturally tend to have less practice than good readers, because they are not fluent enough to read for enjoyment. Moreover, different techniques have been recommended, with two main approaches; firstly variations of 'guided oral reading', where students read out loud and receive systematic and explicit feedback and guidance from a teacher; and secondly, 'independent silent reading', which simply encourages readers to read more, based on a known correlation between the amount of reading undertaken and the development of reading skill.

Interestingly, the silent reading approach does not attempt to evaluate any changes in children's word reading accuracy or speed, but monitors increases in vocabulary and comprehension skills. Poor readers needed an average of 25 hours repeated reading, compared to 18 for the average readers. Overall, this is encouraging because repeated reading requires no particular training or materials, and can be delivered by parents or peer tutors. It is therefore both effective and cost-effective, and can be carried out in the classroom, rather than withdrawing children for costly individual support. By contrast, studies that simply encouraged children to read more had no effect on outcomes in terms of fluency, accuracy or comprehension.

DIRECTIONS FOR FURTHER RESEARCH

A series of points have emerged from the analysis above that suggests that there may be a critical time for intervention. It does not seem to matter whether children are taught individually, in small groups, or as a class. As their reading skills develop, guided oral repeated reading is more successful than simply practicing reading silently. It is clear that children's skills can be improved with a range of interventions, but this becomes more difficult as the child becomes older. The most effective approach would be to identify children as 'at risk' in the early years of school and provide a short structured intervention.

It is clear that providing support at this stage is much more successful than waiting

for children to fall behind. This early support would 'accelerate' the literacy skills of the majority of the children leaving a few children whose difficulties are particularly intractable. This could then be followed by a longer targeted intervention, which addressed the specific needs of the individual child. This would prove not only more effective, but also more cost-effective, providing tailored support for children with real difficulties.

EDUCATIONAL SAVINGS

Intervention can be provided in small groups, and the evidence suggests that this can be just as effective as working with children individually, particularly with younger children. Cost effectiveness can be estimated based on the added value effect size, and the number of hours teacher input per child. This is a true measure of overall cost-effectiveness.

SUMMARY AND CONCLUSIONS

It is clear that the timing of the intervention is more critical than the type of intervention, with an eclectic mix which links sounds and letters producing the best effects overall. The evidence suggests that early intervention (Nicolson et al., 1999, Hatcher et al., 1994, 2006) can reduce the severity of impairments, allowing some children to keep pace with their peers and others to move into a category of milder deficit. This should not only impact favourably on educational costs but also improve standards within education, based on the greater malleability of skills noted in this review in the early years of primary school.

However, it should be borne in mind here that there remain a constant number of children with severe and profound difficulties who will demand higher levels of resources for their educational provision. Moreover, there will be a core of children who fail to improve despite the early years input and will continue to need specialised help in school. Nevertheless, the numbers of these children could be significantly reduced by early intervention, thus ensuring that funding is concentrated on those children with entrenched difficulties.

The implications of these findings on the importance of early intervention should be considered in countries such as Singapore where standards are high, school does not start until age 7, and there will be strong individual differences in the levels od achievement even within children starting school. Pre-school intervention can level the playing field for those with dyslexia and related difficulties.

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Angela has worked with the Dyslexia Association of Singapore for a number of years and is currently a Research Consultant to DAS. She is currently the Editor-in-Chief of the Asian Pacific Journal of Developmental Differences.

A Practitioner's Perspective: Increasing Effectiveness of the Linus Program with Phonics-based Multisensory approach

Dr Aziz Abu Hassan
Executive Committee Member
Persatuan Dyslexia Malaysia

INTRODUCTION

The Literacy Numeracy Screening (LINUS) program was introduced in 2010 to replace a preceding early intervention program known as Kawalan Intervensi Membaca Menulis (KIA2M), which was introduced in 2006. As the results were not too encouraging since its inception, the program was extended initially to Year 2 and eventually to Year 3 such that all schools can achieve their Key Performance Indicator (KPI) in relation to eliminating poor literacy and numeracy skills in all schools. The Ministry of Education (MOE) also raised the minimum requirement for each Year 1 through 3. As at the end of 2014 there is an estimated 1.3 million pupils in the LINUS program in Years 1 through 3.

Persatuan Dyslexia Malaysia (Dyslexia Association of Malaysia) has conducted 6 case studies of pupils in the LINUS program in schools of several states. PDM conducted group educational assessments on these students from Years 1 to 3 with each group ranging from 40 to 60 students. PDM found out that eighty percent (80%) of these students were dyslexics. If we were to extend this same percentage to the total number of pupils in the LINUS program, it would mean that there are 1.04 million pupils with dyslexia in the LINUS program of Malaysian primary schools. This is an alarming data, which must be addressed if Malaysia were to achieve the specific objective of improving the literacy and numeracy skills of primary school students in the LINUS program.

The purpose of this paper is to recommend a suitable and more appropriate and effective approach for implementing the LINUS program in the Malaysian primary schools based on the success of PDM's remediation program that began in 1999.

SUCCESS OF PDM PROGRAM

Before proceeding to the recommendation it seems appropriate to record the success of PDM's remediation program at its centres in many states in the country. Beginning with 6 students at its first centre in Taman Titiwangsa in 1999, PDM has remediated, as of the end of September, 2015, almost 6,700 children with dyslexia in overcoming their reading and writing difference. PDM currently has 13 centres in Malaysia with 4 in Kuala Lumpur (KL) Federal Territory, 3 in Selangor, 1 each in Penang, Kedah, Perak, Pahang, Johor and Terengganu.

Many of the centres, especially those in Klang Valley, in the area of Kuala Lumpur and Selangor, operate a 4-hour intensive educational session from 8:30 am in the morning as well a 4-hour session in the afternoons starting at 1 pm. We also run Saturday classes for our "graduates" (those that have completed their intensive remediation programs) as a tuition program to assist the children with the schoolwork. The Ampang centre initially began with a Saturday morning session but had to set up an afternoon session as well due to the increasing demand from parents.

Before children are admitted into PDM's intensive program they first undergo an educational assessment to diagnose and determine the severity of their learning difference. The purpose of the educational assessments is to determine each child's ability in:

1. recognizing alphabets and numbers (dyslexia and dyscalculia),
2. their awareness of phonics and how to blend phonemes,
3. the legibility of their handwriting (dysgraphia),
4. spelling acumen,
5. ability in constructing sentences and
6. comprehension.

Examples of the outcome of these assessments are illustrated here in the ensuing pages.

The first thing the child has to be able to do is to arrange the alphabets onto the board as shown in Figure 1. The alphabets are taken out and scrambled on the table and the child's first task is put them back onto the board according to the

Figure 1: Alphabet Board

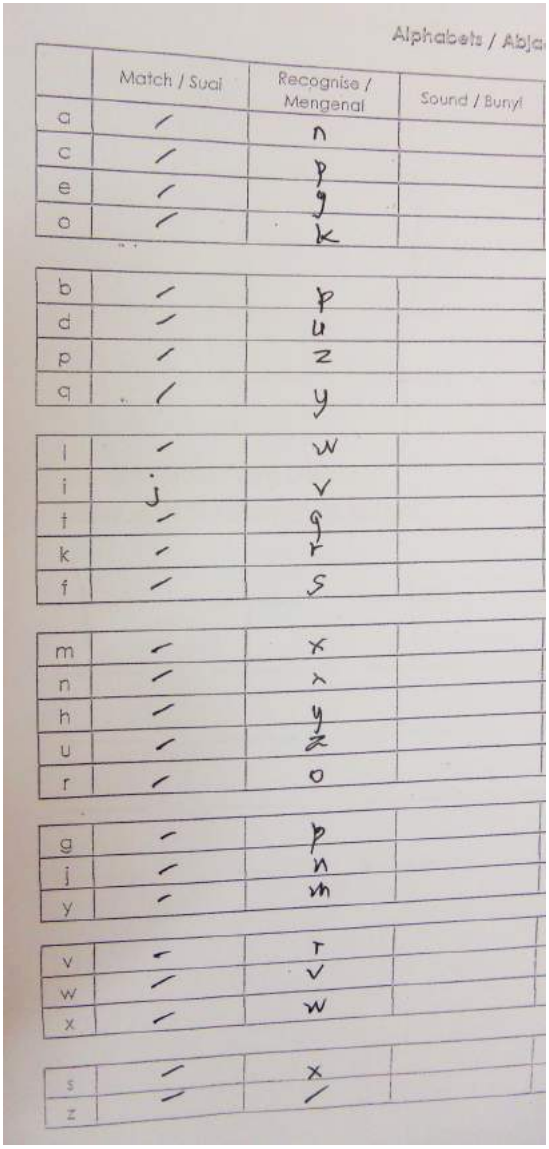


Figure 2: Sequence

shapes. If he recognizes the shapes of all alphabets he should be able to assemble the alphabets in less than two (2) minutes. We have had children who took as long as 6 minutes as they were unable to match the shapes. From this exercise we can already gauge their cognitive ability with regard to alphabets.

We test their recognition further by asking them to point out the alphabet letters. They are asked to identify the letters randomly lest they memorize their alphabets. For those that memorize, they would have to recite beginning with "a" until they reach the letter they have been asked to show.

The sequence is shown in Figure 2. The example shown in Figure 2 is that of a child who had no idea what letters are! In this case he/she could only identify the

alphabets "v" and "z" and that is probably because they sounded the same.

The third step of recognition is the children's ability to write the alphabet out. We also observe the manner in which they hold their pencils and the legibility of their writing. Children with dyslexia often have poor handwriting.

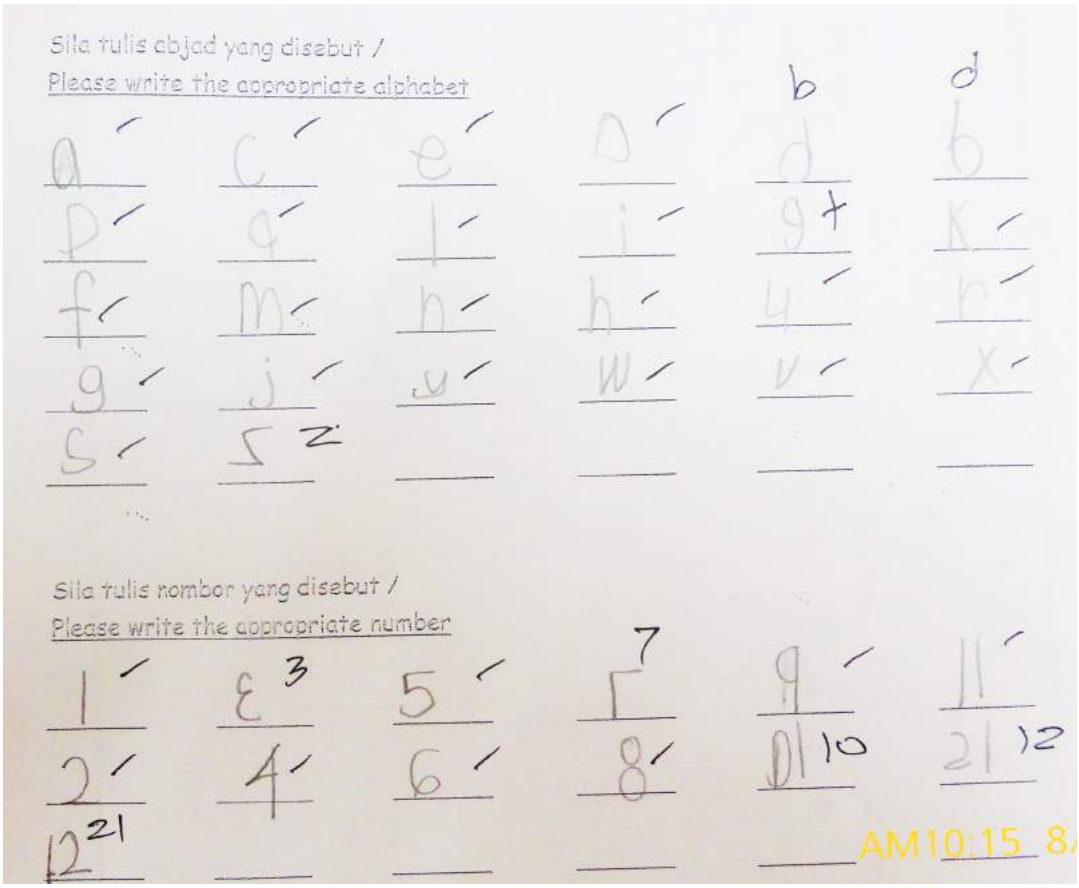


Figure 3: Sample 1 of Handwriting

Figure 3 is a sample of student's writing. Although he can write most of the letters, he has a tendency to write mirror images not only of letters but also of numbers.

Figure 4 is that of a child who could only write 6 out of 26 letters correctly. The rest of the letters he was just merely guessing but being smart enough to repeat them too often.

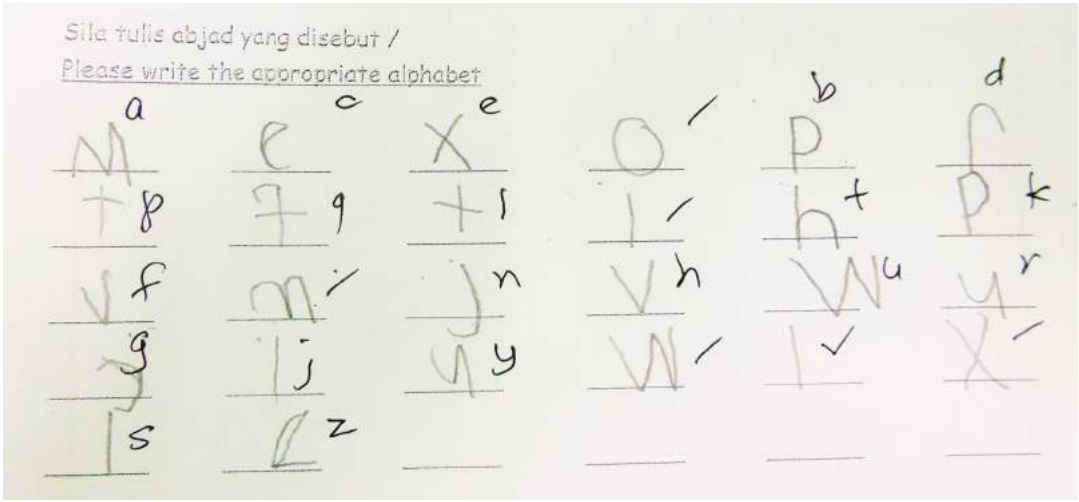


Figure 4: Sample 2 of Handwriting

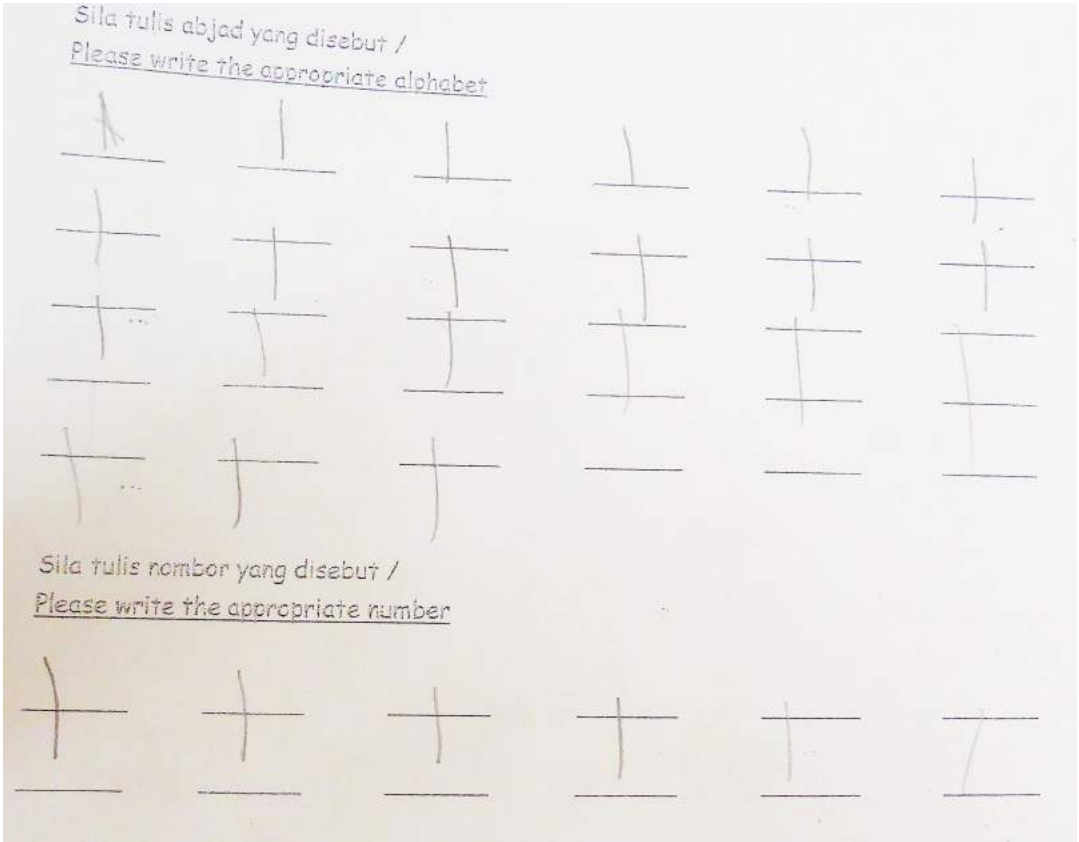


Figure 5: Sample 3 of Handwriting

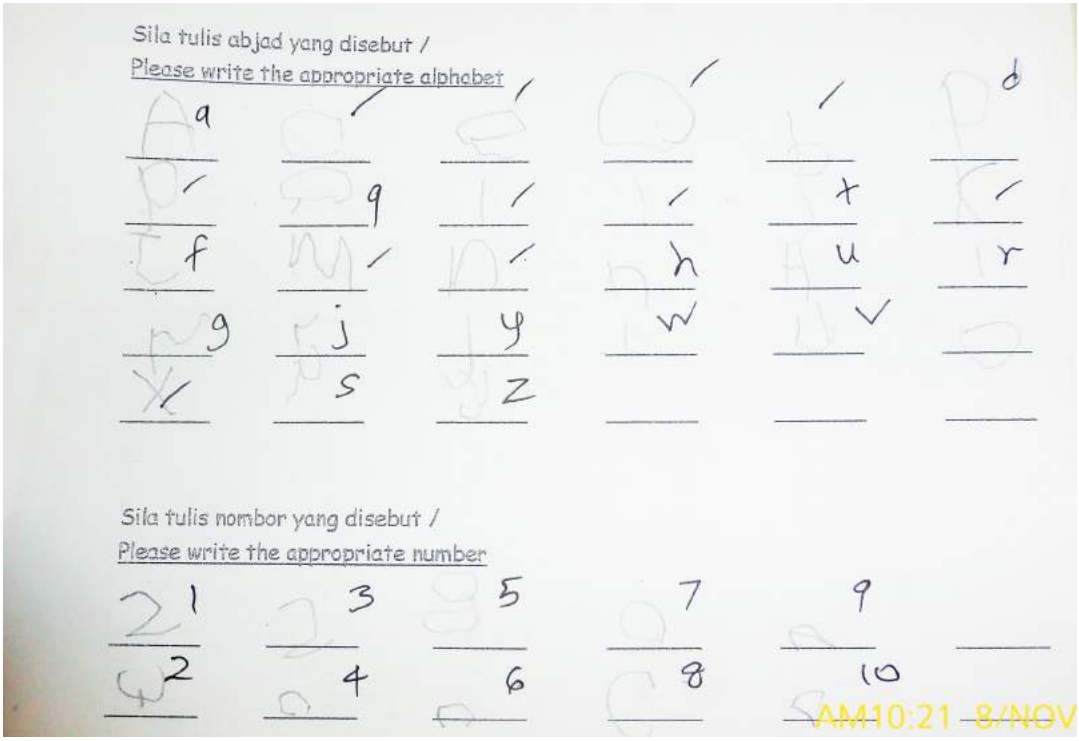


Figure 6: Sample 4 of Handwriting

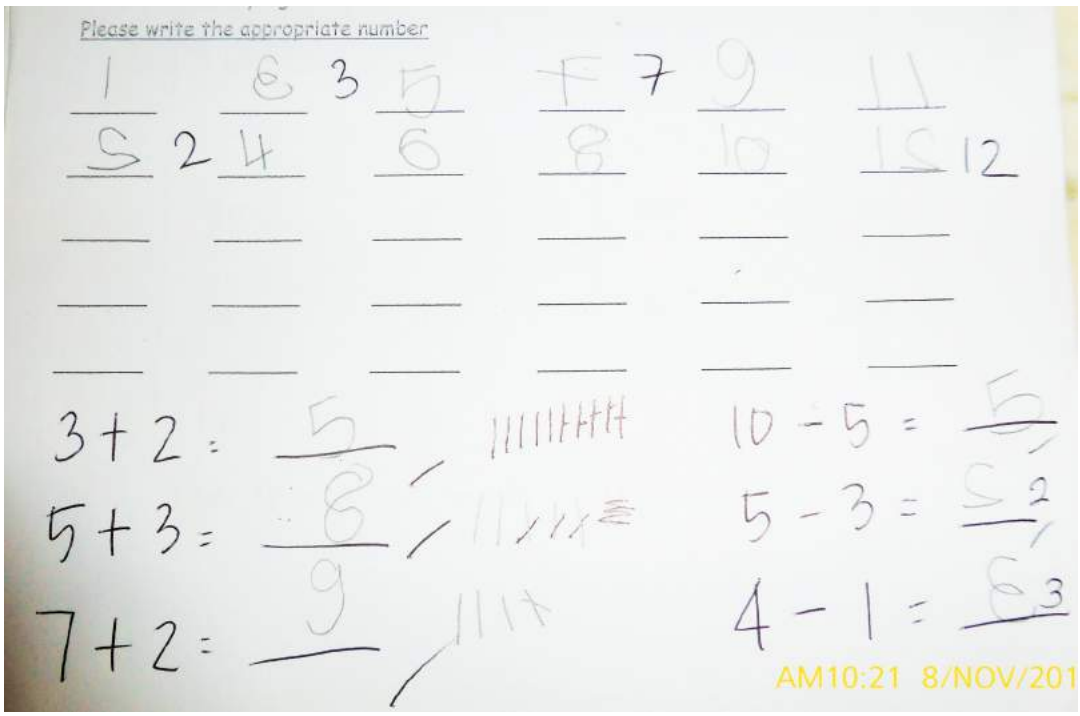


Figure 7: Sample 5 of Handwriting

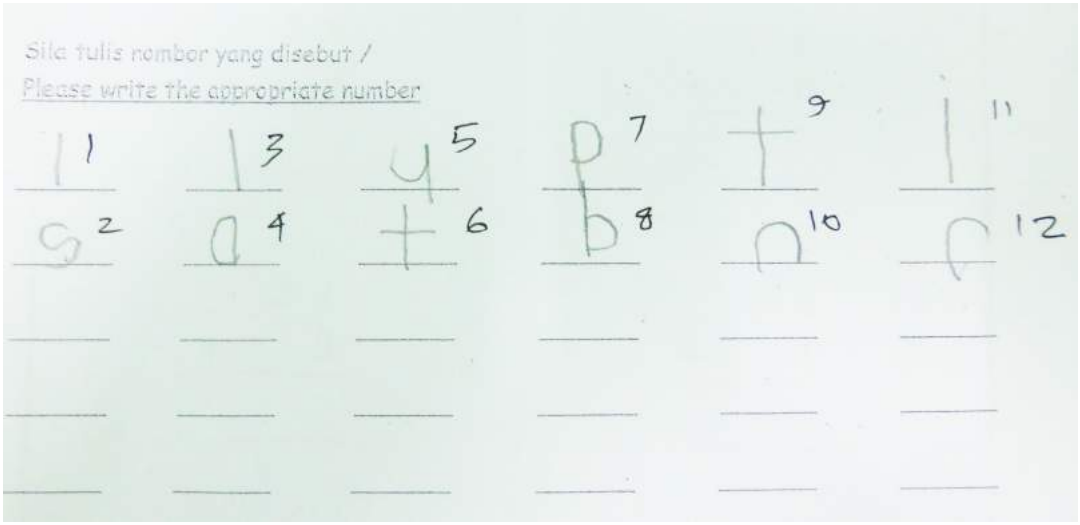


Figure 8: Sample writing numbers

Figure 5 is the writing of a severe dyslexic who couldn't write any letter or number. He merely wrote vertical lines for every single letter or number that he was asked to write.

Figure 6 is a sample of the writing of a child who didn't know how to write any number. He merely copied letters from the instructions, writing a different letter for each number he was asked to write.

Figure 7 is a sample of a child's mirror image writing of many numbers.

Figure 8 is a sample of the handwriting of a child who did not know numbers. He merely copied letters from the instruction thinking of them as numbers.

Once their recognition and writing abilities have been recorded, the children are then tested on their spelling and comprehension skills. We record how fast they can read and whether they are capable of reading the passages with the correct intonation.

If they are capable of reading we then subject them to answering questions without referring to the passage. This is in part done to test their memory as well as their comprehension.

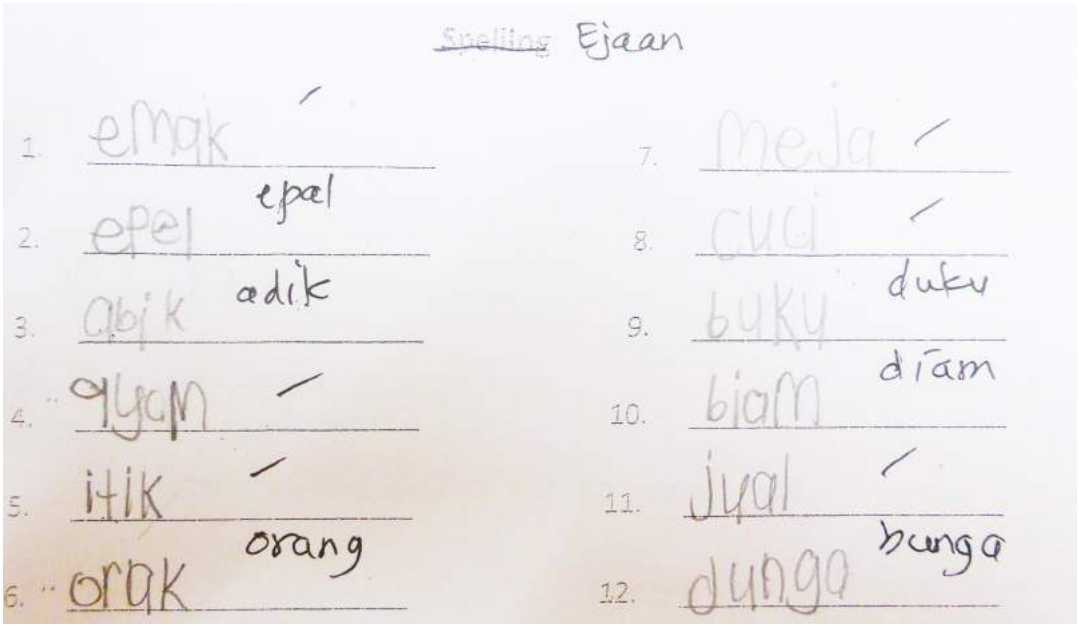


Figure 9: Sample spelling Malay words

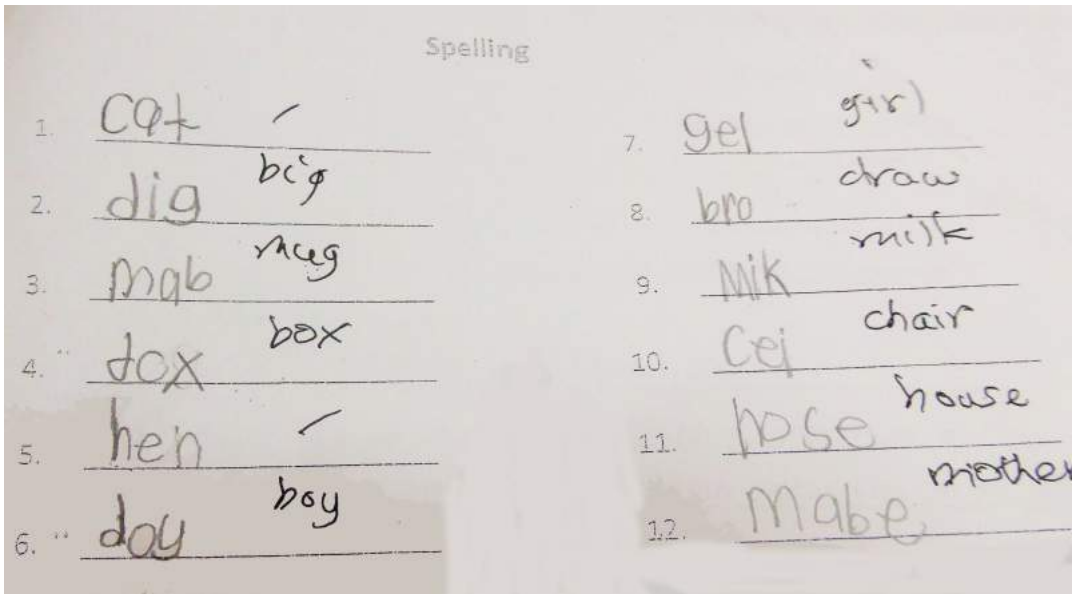


Figure 10: Sample of English spelling

EJAAN

Standard 1 - 2

1	emak	7	meja
2	epal	8	cuci
3	adik	9	duku
4	ayam	10	diam
5	itik	11	jual
6	orang	12	bunga

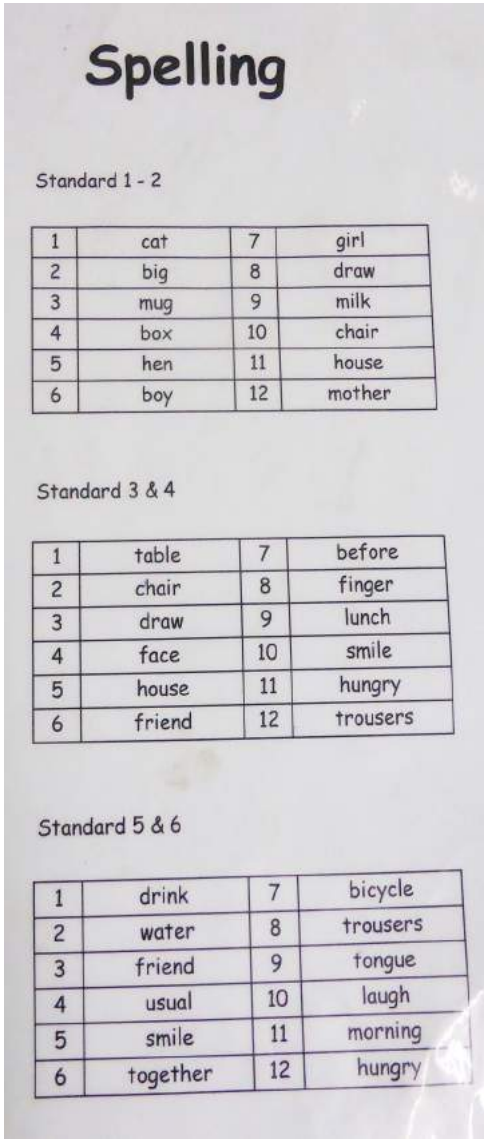
Standard 3 & 4

1	meja	7	ambil
2	duri	8	angkat
3	beri	9	dengar
4	diam	10	sunyi
5	jual	11	pakaian
6	naik	12	nampak

Standard 5 & 6

1	jual	7	kecuali
2	diam	8	kedengaran
3	naik	9	mesyuarat
4	dengan	10	berlainan
5	bangun	11	mengangkat
6	sunyi	12	penyertaan

Figure 11: A list of Malay words for various levels



Spelling

Standard 1 - 2

1	cat	7	girl
2	big	8	draw
3	mug	9	milk
4	box	10	chair
5	hen	11	house
6	boy	12	mother

Standard 3 & 4

1	table	7	before
2	chair	8	finger
3	draw	9	lunch
4	face	10	smile
5	house	11	hungry
6	friend	12	trousers

Standard 5 & 6

1	drink	7	bicycle
2	water	8	trousers
3	friend	9	tongue
4	usual	10	laugh
5	smile	11	morning
6	together	12	hungry

Figure 12: A list of English words for various levels

Figures 9-13 show samples of spelling in both Malay and English words written by the children assessed.

Figure 14 is that of a child being assessed by one of our assessors.

Once the assessment is completed, we have a debriefing with the parents as

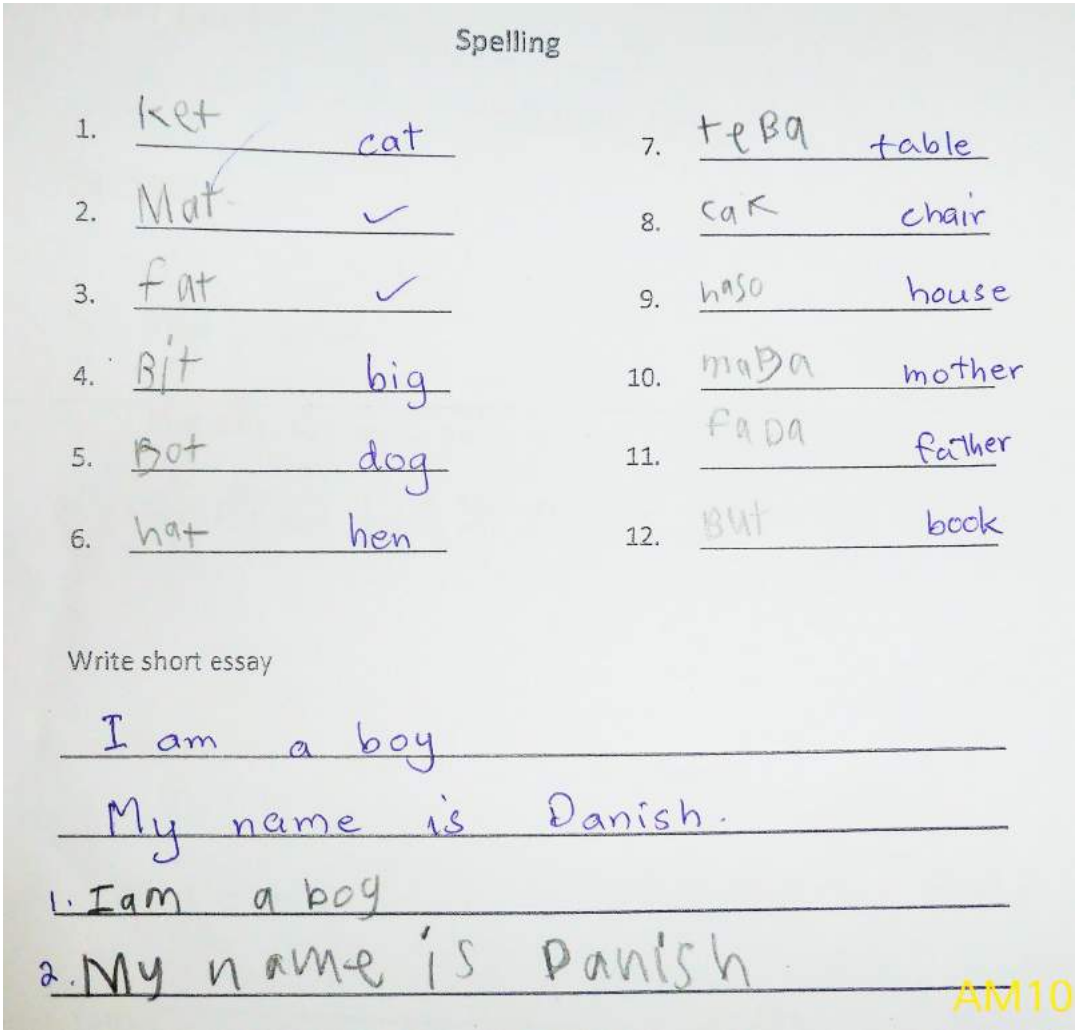


Figure 13: Sample of copying

shown in Figure 15. In this case, the grandmother also wanted to know the outcome of the assessment.

Teachers then prepare individual educational plan, based on the assessments, for each child in her class.

Each class is limited to 5 students per teacher. Classes are categorized as:

(1) beginner, where children are introduced to alphabet recognition and

Figure 14: Conducting an assessment

phonics;

(2) intermediate, where children are taught how to blend sounds; and

(3) the advanced class where students are coached on sentence construction as well as comprehension.

Students are taught only three subjects namely English, Malay and Mathematics, the core subjects in the LINUS program.

Aside from these subjects, students also participate in extracurricular activities that include music, art, concert participation, horse riding and camping; activities which are meant to build up their self-esteem and confidence.

Figure 15: Post assessment briefing with parents

PDM practices a multisensory approach in teaching and teachers make it a point that learning is a fun endeavour. PDM uses the Fitzroy books to teach phonics and reading in English and the Mylexic , an interactive program to learn Malay. We also make intensive use of the alphabet board to introduce alphabet recognition, phonics as well as blending of phonemes. Both the Fitzroy and Mylexic programs are installed in the computers available at all of our centres. Children love the interactive nature of learning as they are usually oriented visually and audio. Furthermore, children have to notice that alphabets are near real too.

At our headquarters, we have two beginner, 2 intermediate classes and 1 advanced class.

Figure 16: Beginner 2 Class

Each class will only have five students to a teacher. The names of each are clearly displayed on the door of each class. Since we also have afternoon sessions, the names of these children are also displayed. In the beginners class each child is given an alphabet board where they will be tested on their recognition, writing and knowledge of phonics. Unless and until they know all of this they will remain in this regardless of their age.

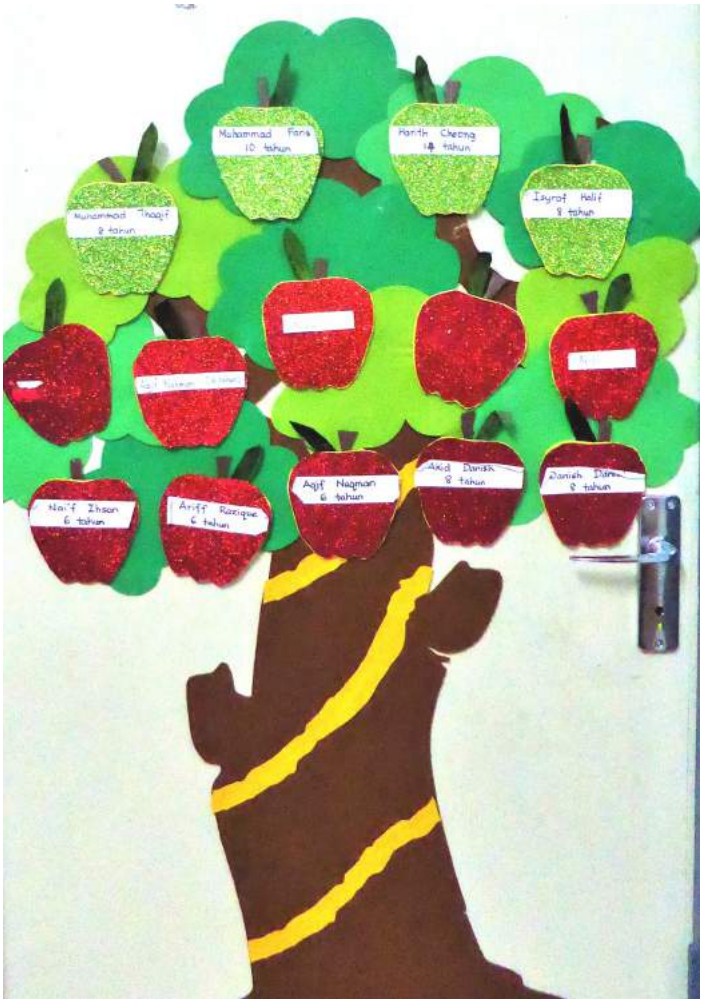


Figure 17: Beginner 1 Class

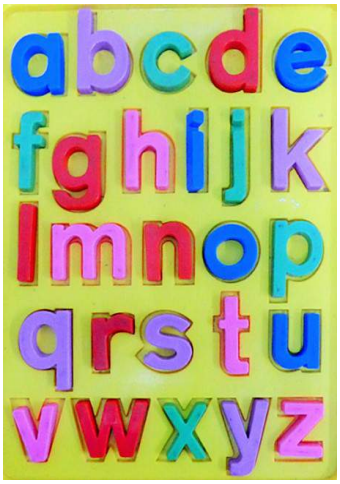


Figure 18: Alphabet board

Figure 19 Forming words with ending sound "at"

Figure 20: Forming words with ending sound "in"

Figure 18 shows one of the alphabet boards used. We have a less expensive one too which is currently being used for all students.

Once the students have mastered the alphabets they then progress to the intermediate class where they will learn blending of phonemes and how to form words and at the same time spelling.

Figures 19 and 20 demonstrate how students will be asked to form words from the sound "at" and "in" by changing the first letter.

Figure 21: Forming words with ending sound "in"

Similarly, they will be asked to form Malay words either from the ending or starting sounds. By doing this they will understand that by simple manipulations of sounds they can form new words which will also increase their vocabulary. Playing games is always the best way to learn and this is how they learn to form words as demonstrated in Figure 21.

Once the students have mastered spelling and eventually reading they are promoted to the advance class. Here the students are taught how to form sentences; once again playing around is the best approach to teach. Teachers also will ask students to read a passage and write complete sentences as answers. Writing essays will be the most difficult for dyslexic students when they eventually return to the national school. Hence we have to ensure that the students are not afraid to do so.

Two-thirds of students who enrolled in our program overcome their learning difficulty within 3 months and almost all within a period of 6 months. Severe dyslexics often take close to year to overcome their difficulty hence PDM cannot make a claim of one hundred percent (100%) within 6 months.

LINUS Program

The program for English is broken down into 12 constructs as follows:

1. Able to identify and distinguish the shapes of the alphabet.
2. Able to associate sounds with the letters of the alphabet.
3. Able to blend phonemes into recognizable words.
4. Able to segment words into phonemes.
5. Able to understand and use the language at word level.
6. Able to participate in daily conversations using appropriate phrases.
7. Able to participate in daily conversations using appropriate phrases.
8. Able to understand and use the language at phrase level in linear texts.
9. Able to understand and use the language at phrase level in non-linear texts.
10. Able to read and understand sentences with guidance.
11. Able to understand and use the language at sentence level in non-linear texts.
12. Able to understand and use the language at paragraph level in linear texts.
13. Able to construct sentences with guidance.

The above is obtained from the Operationalization Book LINUS 2.0 published by MOE in May 2015 for English. In Year 1 students are expected to be fluent with a minimum of 200 words and simple phrases, Year 2 with minimum of 300 words, simple phrases and sentences and Year 3 minimum of 400 words, phrases, sentences and short paragraphs. Note that emphasis wasn't given to awareness and knowledge of phonics and the blending of phonemes, which is not surprising since phonics has only been included in May 2015. Students must understand and know how to blend phonemes first before they are able to be fluent with words. This is why there are so many students in the LINUS program as they have not crossed the first hurdle of knowing phonemes and how to blend them.

Phonics was only included as one of the constructs in 2015. While the program is successful in early intervention, it is less successful in overcoming the students' difficulty mainly due to the high student-teacher ratio of 20 and not adopting a multisensory approach in teaching. Instead, Linus adheres to the rote learning approach, an approach that is bound to fail for children with dyslexia simply because most of them have a poor short-term memory. Dyslexic children learn best by understanding what they learn and this is easily achieved with an orientation towards visual, audio and kinesthetic. Hence our proposal that a program akin to the one practiced at PDM is adopted in schools to ensure a more effective program.

Although Strategy 4 of the LINUS 2.0 included consultation and collaboration of Persatuan Ibu Bapa & Guru (PIBG) or the Parent Teacher Association (PTA), I believe this has not been implemented extensively across all schools in the country as many

parents are at a loss when they seek guidance on how to handle their children with dyslexia. While the Operationalization Book is rather comprehensive we believe that it hasn't been communicated well along the line. Recently a Parent Support group has been formed and we hope that through this group the concerns and shortcomings can be made known and discussed with MOE officials. Consultation with PIBGs, PDM and parents of children with dyslexia should be strengthened so that the LINUS program is not done in isolation at the MOE level only but with feedback from parents of students. A new post has been created known as FasiLINUS in 2015 and this should facilitate a better implementation of the program.

No doubt the MOE will have to allocate more funds or re-arrange their allocations around to adopt our recommendations but we are of the opinion it should be done so as children with a learning difference are entitled to an appropriate education as enshrined in the Federal Constitution. I would like to make the following recommendations.

First, educational assessments for dyslexia should be made mandatory for all students in LINUS classes. Once identified as being dyslexic they should then be assigned to a dyslexia class. Although there are 65 primary schools with dyslexia programs currently, with this requirement more schools will now have dyslexia programs. A child or clinical psychologist should then do an assessment on the children who are identified as not being dyslexic. More likely than not, these children are slow learners which are more suitable for the existing pemulihan (remediation) classes.

Second, on the premise of our estimate of 1.04 million children with dyslexia in primary schools, MOE would have to assign 208,000 special education teachers if the student teacher ratio of 5 is adopted. (This estimate was made in our letter to the Editor of The Star, a Malaysian newspaper, which was published on 28th October, 2015). This implies that a curriculum for dyslexia must be included in the teacher training colleges if this number of teachers is needed. Currently there are barely enough teachers in the dyslexia programs. Should a teacher be on leave or transferred or promoted to another school, there will not be a replacement teacher.

Third, as we feel the alphabet board, which costs RM20 each, is an integral part of overcoming LINUS then a further RM 20.8 million is need to supply each dyslexic student with an alphabet board. Although there is mention of "instrument saringan" or a screening instrument, we are not clear if there are any additional teaching materials and equipment for use in LINUS classes.

Fourth, schools should install the interactive Mylexic and Fitzroy programs so that students would enjoy learning better. Dyslexics tend to learn better by seeing,

hearing and manipulating rather than through rote learning.

Fifth, pencil grips should be supplied to each of the 1.04 million children to ensure they know how to hold the pencil properly and also to improve their handwriting. Children with dyslexia are known to have poor handwriting and this is a part of the problem of why they are slow in writing or are poor in copying.

CONCLUDING REMARKS

Although the LINUS program is a successful early intervention program in identifying students with difficulty in literacy and numeracy skills, it is not as successful in aiding children with dyslexia. Success can be further improved and at a faster rate if a phonetic based and multisensory approach, which has been successfully implemented at PDM's 13 centres, is adopted.

ACKNOWLEDGEMENTS

I wish to thank Puan Sariah Amirin, President, PDM for her guidance, understanding and collaboration in carrying out responsibilities for and on behalf of the association. I also would like to thank Ms. Poongkody Pallail for agreeing to edit this paper. Mistakes are mine alone.

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ABOUT THE AUTHOR

Dr. Aziz Abu Hassan has a PhD in Agricultural Economics and spent most of his working life in the finance industry in Malaysia. After discovering his son is dyslexic in 2008 and his daughter a dyscalculic in 2010, he left work and has devoted his spare time doing voluntary work with PDM in various portfolios. In 2010 he created www.facebook.com/dyslexia.malaysia to create awareness in Malaysia and also www.facebook.com/dyscalculia.malaysia in 2013 to create awareness for dyscalculia. Currently he is promoting a parent support group to lobby for a legislature on dyslexia in Malaysia, www.facebook.com/groups/my.dyslexia. He is one of the assessors for PDM.

Screening and Intervention for Dyslexia in Indonesia – Developing the LexiPal Program

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Dyslexia Association of Indonesia

ABSTRACT

In this article, we outline the background on education and dyslexia in Indonesia, establishing that there remains much still to be done, despite recent efforts to improve outcomes. A key issue identified world-wide is identification and support for dyslexia in the early years, in order to improve outcomes. A computerised screening and intervention test developed in Bahasa Indonesia for use in the area is outlined, that may be applied widely for 5-7 year olds without the need for heavily trained personnel, in recognition of the limited resources available to many schools in this region. The program is designed on well-established multi-sensory principles, and allows a baseline of performance to be established, prior to the intervention process, with data stored to measure achievement. The program is designed to be engaging and fun, as well as to address a breadth of key issues for dyslexia, including memory, categorisation, direction, similarities and time, in addition to literacy. Further research is needed to demonstrate the effectiveness of this approach with Indonesian children, that has been modelled on best practice world-wide.

Keywords: Computerised Screening, Bahasa Indonesia, dyslexia

Education in Indonesia continues to struggle to increase the rates of literacy across the area, despite recent improvements in availability of schooling and recognition of the importance of good teaching. In the early years of school, children attend for just 3 hours daily, and pre-school education between the ages of 4 and 6 is not yet available to all (Suryandarma and Jones, 2013). The difficulties Indonesia has experienced are reflected in the latest PISA figures, which show that this country is 61st out of the 65 participating countries for reading, although Indonesian children are the happiest in the world on this survey. This is by contrast with other Asian countries, such as Singapore, that fall in the top 5 for literacy, but similar to the results from Malaysia, their neighbours. How can we increase the levels of performance, while maintaining the good results in terms of overall wellbeing?

The situation is more complex for those 10-20% of children who suffer from dyslexia, who are currently poorly served in general, despite the excellent work of the Indonesian dyslexia association. This means that there are few standardised tests available and no formal concessions for children in examinations. Children with dyslexia are misunderstood by their teachers, their peers and their parents, and may be mistakenly assumed to be stupid.

Currently, only middle class children who can afford to pay for specialised schooling can access the support available through the paediatric special school and clinic run by the authors. A search of the literature reveals few publications in English from Indonesia, and more research is needed to address these issues. This contrasts with Malaysia, where a move towards early screening has been supported by NECIC, and a number of researchers have published data linked to the screening tests developed in the UK for dyslexia, specifically the DST-J with 8-year old children (Kaur, 2012) as well as locally devised tests (Lee Lay Wah, 2008).

Moreover, there are concessions available for dyslexic children in Malaysia, that are not yet forthcoming in Indonesia. Identification of the number of dyslexic children in Indonesia and the need for support can help to fuel the case for legislation to level the playing field. However, there seem to be no intervention approaches developed yet for use in Bahasa.

Research from across the world has identified the importance of early screening and intervention for dyslexia, with Torgesen in the USA showing that if intervention was left until a child was 8 or over, 67.5 hours of individual intervention would be needed to bring the child up to the level of their peers. Research from the UK, by the editor of this journal and her colleagues has shown that screening followed by small group intervention for one hour a week for 10 weeks can bring the performance of 5-6 year old children up to the required level (Nicolson et al, 1999), whereas 7 year old children have fallen further behind and need further support in order to progress

(Nicolson et al, 2000; Fawcett et al, 2001).

Interestingly this approach, using only 10 hours intervention in all has proved one of the most effective and cost effective in reviews of intervention (Brooks, 2007) and has been shown to be effective when teacher or computer led. This model has been widely used in Wales, with local schools working with more than 700 children in reception and 75% of the children catching up with their peers.

In order to undertake this type of screening and intervention, it is necessary to develop materials that can be targeted to the local language, given that many young children do not learn literacy in English. Until now, there have been no instruments available in Bahasa Indonesia. Moreover, it is particularly important where resources may be lacking to ensure that these materials are available in a computerised format, to reduce the demands on teachers' time in delivering these tests.

This model will work by gathering initial data on each child's performance, in the pre -intervention evaluation phase, followed by intervention, the 2nd evaluation following mastery training. In this approach each child's performance will be compared with their performance after intervention, allowing a naturally occurring experiment to be undertaken on the impact of the program.

THE DEVELOPMENT OF LEXIPAL

LexiPal is a "learn-to-read" application especially designed for Dyslexic children in Bahasa Indonesia. This application is developed for dyslexic children in the age of 5 to 7 years or pre-school or first year of elementary school. LexiPal has been designed to be used not solely by children, but with guidance from parents, teachers, therapists, and others. A key feature is that the program may be used with minimal initial training and is therefore suitable for all levels of adult guidance.

KEY FEATURES

LexiPal has four main features, namely:

1. Children Database

   The database contains of a list of children who are using the application. The data entered in the database system are name, age, gender, and photograph. In this feature, the users can add, update, or delete data of the children.

2. Scheduling

Scheduling is used by the users to arrange the learning schedule of children. The schedule can be correlated with the Individual Educational Plan (IEP) that is made by the users based on the results of the diagnosis of the doctor or psychologist. This schedule does not intend to limit the flexibility of the users to improvise what they are learning. (See figure 1)

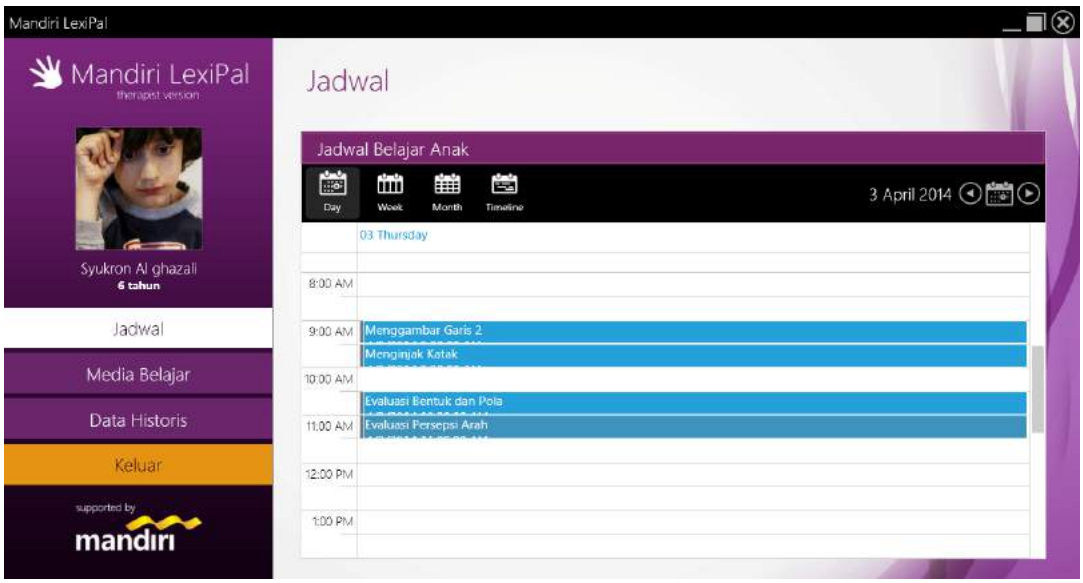


Figure 1. LexiPal Schedule

Learning Media

This feature contains learning material of pre reading skills to reading skills that can be used by the users to teach. The material has been specially designed based on the specific needs of dyslexic children and in accordance with the stages of learning that has been validated by doctors and therapists.

3. Historical data

Record keeping is by means of Historical data used to maintain a record of the children's learning progress. The records stored come from the training and evaluation media, providing a baseline for starting performance. In this feature, the users can see the list of badges "achievement unlocked" that can be obtained when the children master a particular category. This badge can be printed in the form of certificate. (See Figure 2)

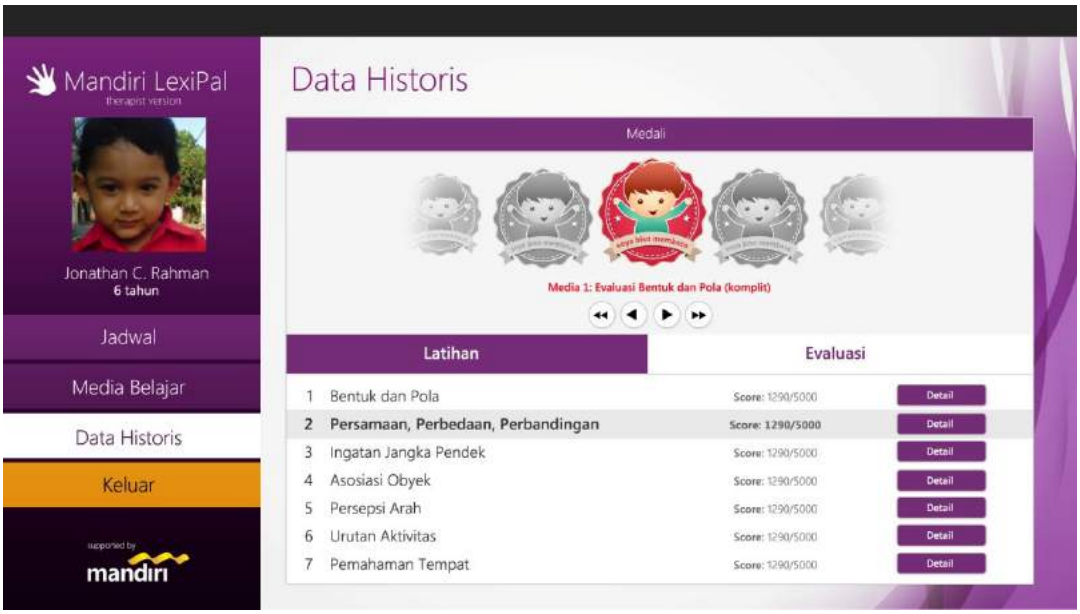
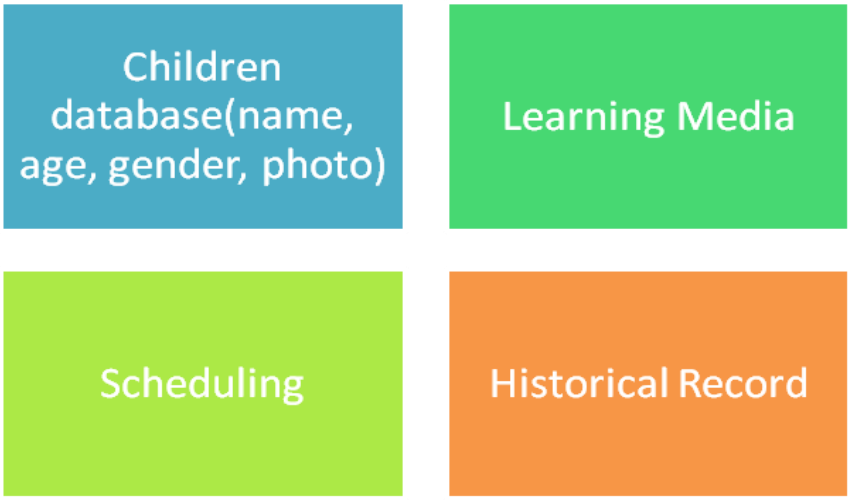


Figure 2. LexiPal Data History

In the table, the feature can be seen as follows:



MEDIA TYPES AND CATEGORIES

This feature is designed based on three of the most important approaches in teaching dyslexic children, namely:

1. **Multi sensory method**

   In this approach, the material taught to dyslexic children involves various senses of the body so there is more information than they can catch from the eyes (to see), ears (to listen), hands (to touch) independently, or followed by range of motion. So it always includes visual, auditory, tactile, and kinaesthetic. Therefore, the learning media designed by the NextIn Indonesia attempts to accommodate those needs. (See Figure 3)

2. **The use of different media to teach 1 (one) material**

   Based on research, the dyslexic brain is different from most other people, especially in regards to receiving and interpreting information. To tackle this problem, doctors or therapists usually attempt a variety of therapy methods with various media so that children can understand and ultimately find the best way of learning for them. Doctors and therapists at the Dyslexia Association of Indonesia said that sometimes to teach one material, they have to use 20 different methods. Therefore, LexiPal mimics that approach by providing a variety of media to teach one item of material to the children.

3. **Prioritise motivation rather than punishment**

   Dyslexic children are already heavily burdened with their problem. If they get punished often and frequently experience failures, they will look down on themselves and get stressed, and their self esteem will plummet. Thus, motivating them and giving them recognition for any success they achieved, no matter how small it is, is necessarily important. The point is to minimize the experience of failure. Furthermore, the learning media is always incorporated within a game design (gamification) to motivate the children to keep learning.

Based on the above considerations, learning media features are divided into three different types, namely: learning media, practice media, and evaluation media. The comparison of those three media can be seen in the following table.

Table 1. Learning Media Features

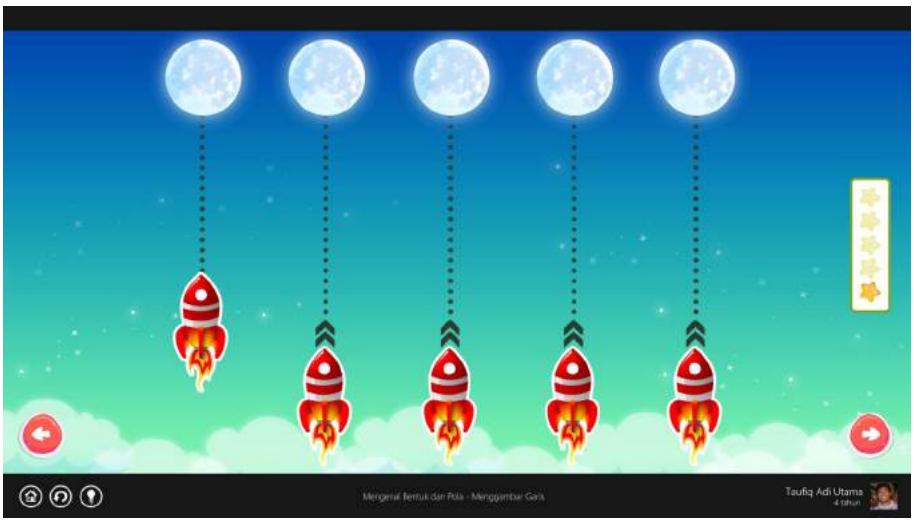
Comparison	Learning	Practice	Evaluation
Guide involvement	High	Low	None
Scoring	None	Available	Available
Result Summary	None	None	Available
Historical data	Not saved	Saved (Daily and per-Media)	Saved
Approach	Visual, Auditory, Kinaesthetic, Tactile (touch screen)	Visual, Auditory, Kinaesthetic, Tactile (touch screen)	Visual, Auditory, Tactile (touch screen)

In addition to having different types, the learning media is also divided into 12 (twelve) different categories, with all those categories stating the ability that has to be mastered by the children between the ages of 5-7 years. Moreover, those abilities are closely related to reading abilities or the difficulties often faced with dyslexia.

Those 12 (twelve) categories are:

1. Shapes and Patterns
2. Similarities, Differences and Comparison
3. Short-Term Memory (adapted from Nicolson and Fawcett, 2003, Fawcett and Nicolson, 2005)
4. Object Association
5. Direction Perceptions
6. Activity Sequence **
   Activity Sequence category related to the ability to sort some steps of activities. In this category the children practice to take actions showed by activity pictures based on appropriate order/sequence, such as sequence actions while taking bath, sequence actions while preparing meals, etc. It helps children to identify actions from the beginning, the middle, and the last step of one kind activity. And stimulate them to think carefully before they execute activation spontaneously.
7. Understanding Place
8. Time Concepts

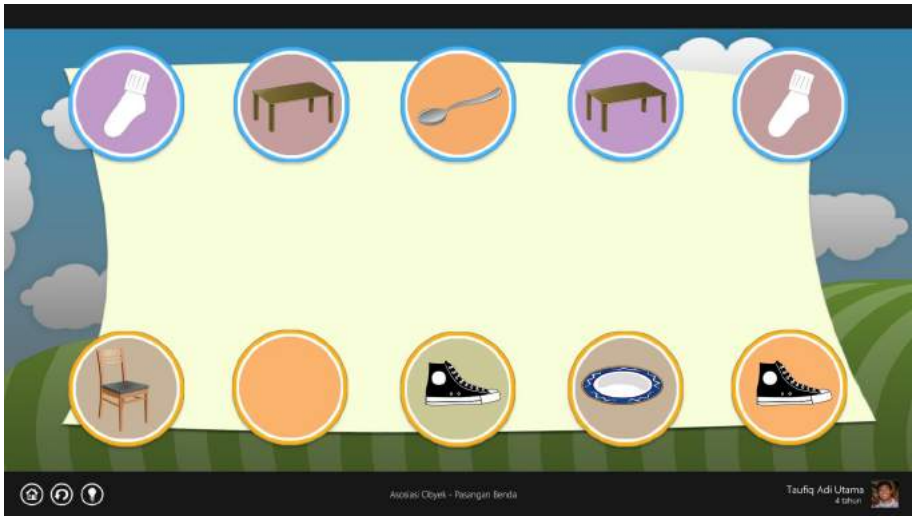
9. Functional Skills ** Many dyslexic children find difficulty in identifying social language such as body gesture, body posture and facial expression, so then they often mention inappropriate comments or show inappropriate body gesture/posture as response to social situation. Functional Skill category teaches the child everything needed in functional activities. In this category game, children practice to identify some facial expressions such as happy, sad, angry, scared, surprised, and they practice to associate proper facial expression to certain condition accordingly. It helps children to widen their understanding of social clues so then they were able to socially response more properly in terms of verbal and behaviour.
10. Letters
11. Syllables and Words
12. Simple Sentences



1. Shapes and Patterns

2. Similarities, Differences and Comparison

3. Short-Term Memory

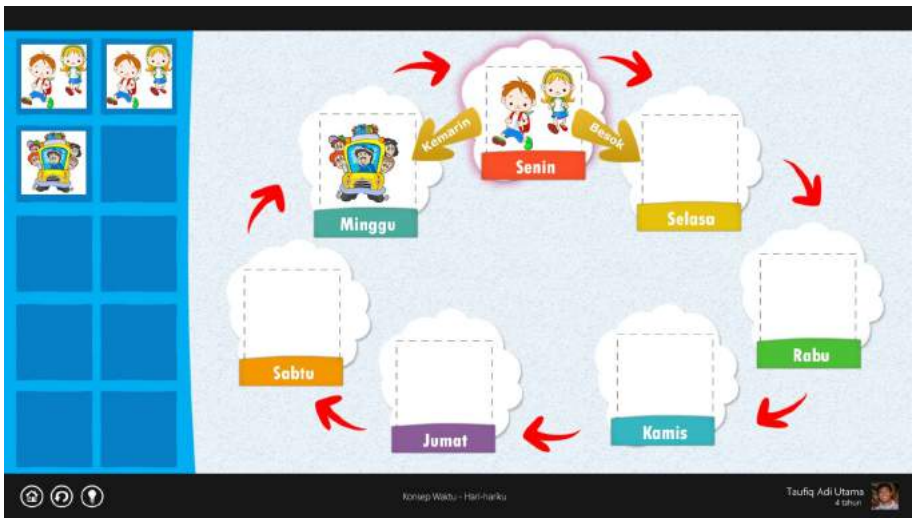


4. Object Association

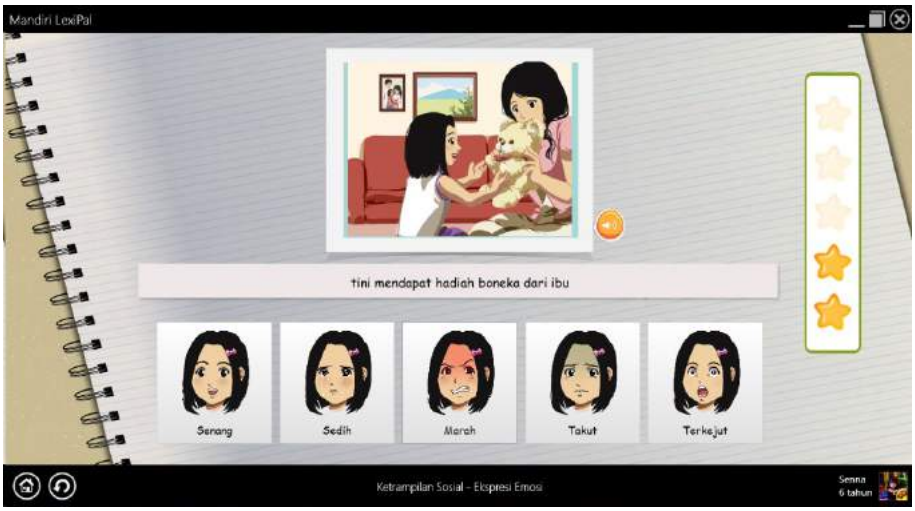
5. Direction Perceptions

6. Activity Sequence

7. Understanding Place



8. Time Concepts



9. Functional Skills

10 Letters

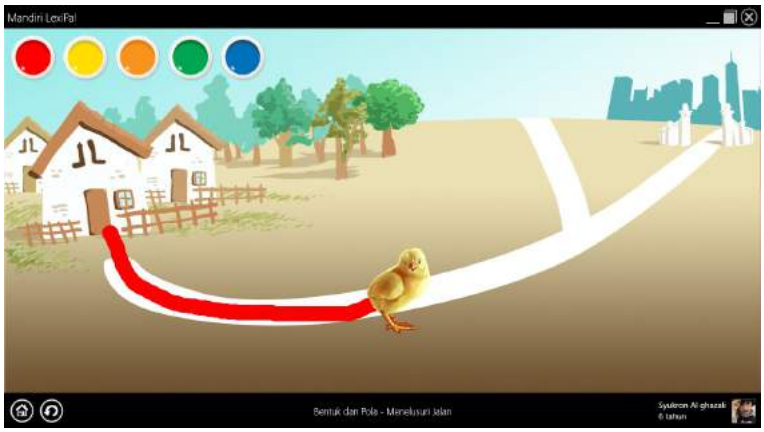
11. Syllables and Words

12. Simple Sentences

THE STRENGTHS OF LEXIPAL

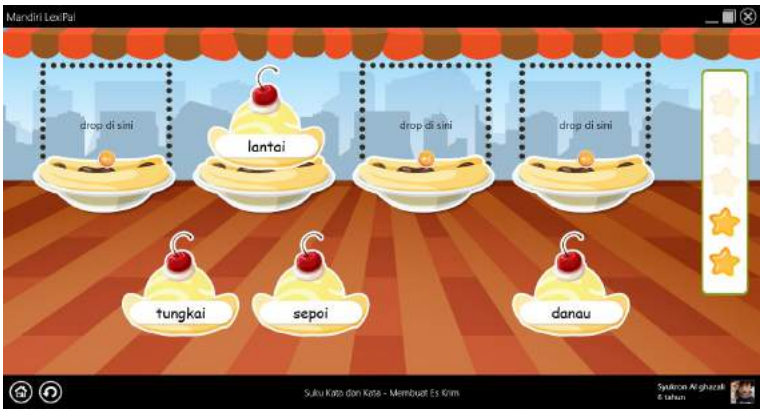
Attractive and Fun

The learning media in LexiPal is designed to be close to the world of children which is full of games and colours that make it more attractive and fun.



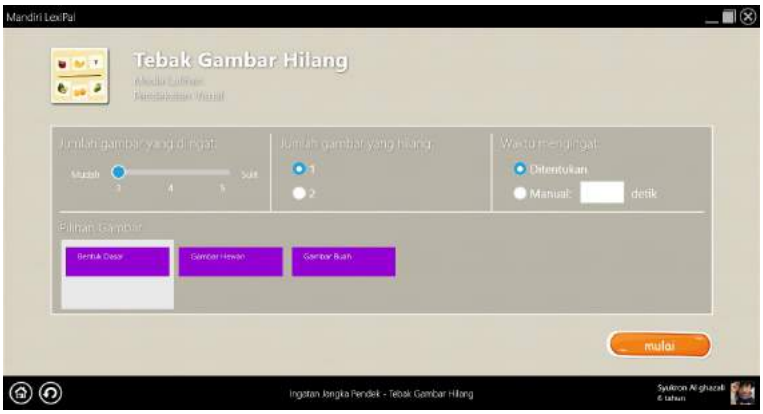
Motivating

With scoring system, rewards, and certificate, LexiPal can encourage or motivate the children to learn more.



Suitable with the children's ability

Every child is unique and different. Almost all the learning media in LexiPal provide a menu that can be used to arrange in accordance with the needs and abilities of the children.



Multisensory Method

LexiPal adopt that approach by involving as many senses as it can so that the children are able to catch the information better, through visual, auditory, and also kinaesthetic processing.

Scheduling

The users can create the learning schedule as the reminder of studying time of the children.

Historical Record

Monitoring the children's learning progress is the responsibility of parents and teachers. LexiPal provides historical data to help the users to monitor and to see the children's learning progress in details.

Originally from Indonesia to Indonesia

LexiPal is purely developed by Nextin Indonesia together with Dyslexia Association of Indonesia, sponsored by Bank Mandiri.

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EDITORS COMMENTS

A recent informal evaluation of the Lexipal programme was undertaken at Indigrow Children Development and Autism Centre, a special school in Bandung, Indonesia run by the Dyslexia Association of Indonesia, by the journal editor, Angela Fawcett.

The school itself caters for a small number of children with dyslexia and a number of older children with autism. The whole atmosphere is very family orientated, with parents clearly welcome to participate, and the whole family, including grandparents where available, taking part in the counselling sessions associated with the school. Children are taken out of mainstream school for placements here, and returned to their original school once a satisfactory level of progress has been achieved. There is strong attention to aspects of pastoral care and self-esteem, as well as the educational outcomes for the pupils. A key aspect is the use of music to improve overall functioning.

The children participating were aged between 7 and 11, were largely boys but included one girl, and all held formal diagnoses of dyslexia from the authors. The children clearly enjoyed participating in the program, vying for their turn to take part. A choice of methodology was used, either working with the touch screen or using the whole body as a tool to work the computer program in an interesting demonstration of the multi-sensory whole child approach.

The aspects of the program evaluated included letter and grapheme recognition, judgements of time, and direction. The first two aspects used the touch screen, and the direction program used the whole body. So for example, the instruction would be to turn right or left and the child would move accordingly. The program used both whole body and hands, so that the children taking part could jump and stretch out their hands to indicate the direction the programme required. This was clearly highly satisfying for the children involved, and looked as if it was great fun.

The researchers who had developed the programme for use within the school and elsewhere had taken place in observation sessions over several months, observing the children and what they struggled with. These researchers understanding of the difficulties involved in dyslexia was informed by the rich level of understanding the children received within the school itself.

A programme of systematic formal evaluation is now underway, with baseline information maintained by the software, and programs that are adaptive to the progress of the children. Data is now in the process of being collected from across Indonesia, and the pre and post performance of a substantial group of children will be evaluated and reported in a later edition of this journal.

In summary, the authors have been instrumental in developing a new computer based program that will address many of the issues troubling education in Indonesia. Built into the program is a knowledge of dyslexic children and the areas they find difficult. It is designed for use without high levels of training, and addresses some of the issues of scarcity of resources and lack of skilled teachers outlined in the introduction. Informal evaluation by the editor, Fawcett, suggests this is an impressive and useful tool for Bahasa Malay and a first in this language.

Inhibitory Control and Literacy Outcomes in Preschoolers With and Without Risk of Reading Difficulty

Siew Hui Li, June
Head of DAS Academy
DAS Academy Ltd

INTRODUCTION

Inhibitory Control (IC) has been identified as a central feature of the development of executive function in early childhood (Diamond, Carlson, & Beck, 2005). It has been also been argued to underlie the development of the other executive functions (Barkley, 1997). It is the ability to inhibit automatic impulses and actions, and suppress instant gratification to do what is most appropriate and necessary. For a frustrated young child whose toy has been snatched away, IC would allow the child to resist the urge to bite or fight his friend. For an adult dining with a friend, IC would allow the adult to resist the urge to check the mobile phone when it buzzes.

> "Executive function, including Inhibitory Control, predicts early mathematics, early reading ability and learning related behavior. Conversely, poor executive functions, including IC, at an early age predicts poor school readiness and problem behaviours in preschool."

Particularly, performance differences in IC in children as young as two years of age have been reported (Hughes & Ensor, 2007). It continues to show major changes between four and six years of age (Hughes & Ensor, 2011) and IC differences in early childhood can be predictive of outcomes throughout life in longitudinal studies (Mischel,

Shoda, & Rodriguez, 1989). Executive function, including IC, predicts early mathematics achievement (Blair & Razza, 2007; Clark, Pritchard, & Woodward, 2010), early reading ability (Blair & Razza, 2007) and learning related behaviour (Denham et al., 2012). Conversely, poor executive functions, including IC, at an early age predicts poor school readiness (Hughes & Ensor, 2007) and problem behaviours in preschool (Hughes & Ensor, 2008). Thus, the early development of IC has far-reaching consequences in the life of a child.

The role of IC in children, especially those who are at risk of reading difficulty, is worth investigating. Currently, research regarding the causes and predictors of children's reading success and failures abound and the topic has evoked researchers' interest mainly because of influences from other reading research. It has been suggested that a child's reading ability is highly constant from a young age; a good reader tends very much to continue to be a good reader and writer later on (Juel, 1988). Additionally, researchers have also established that early intervention leads to greater reading gains than late intervention (Torgesen, 2000).

Literature on reading failure has approached it mainly from an angle of cognitive processing, viewing poor readers as a stereotypical group who have the same cognitive processing deficits such as poor phonological processing, rapid naming, and working memory. These have been referred to as cool executive functions.

THE NEED TO CONSIDER HOT IC

There is data emerging from few studies suggesting that children with reading difficulty have been found to be impaired in IC compared to typically developing children (Helland & Asbjørnsen, 2000; Reiter, Tucha, & Lange, 2005; van der Schoot et al., 2004). However, in those studies, the traditional and conventional approach of measuring IC is dominant. The conventional approach is heavily influenced by cognitive psychology which explains the reliance on abstract and artificial test batteries to tap cognitive processing and measure executive function, thus reducing the affective human brain to an inert computer system.

These tests batteries are referred to as "cool" cognitive tasks which do not reward or punish and hence do not evoke personal significance for the participants. Nevertheless, the attention on cool IC is reasonable. In a meta-analysis study of 75 peer-reviewed studies of preschool children, cool IC tasks have been found to be more related to academic skills than hot IC tasks (Allan, Hume, Allan, Farrington, & Lonigan, 2014).

Despite the above, more recently, researchers from a variety of disciplines have

called for "hot" features of IC to be recognised and emphasised (Zelazo & Carlson, 2012). The hot distinction which recognises the contribution of motivation and emotions in behaviour, has also been supported by neuroscientific research on the functions of the orbitofrontal cortex (Rolls, 2004). In spite of the contributions of hot IC, hardly any studies exploring IC in children with reading difficulty have adopted this. For this reason, it will be appropriate and timely to approach the construct of IC in at-risk children from a hot and cool perspective.

In addition to the neuroscientific research, lesion studies involving human and nonhuman animals have also suggested that hot executive function can be dissociated from the cool aspects of executive function. For example, hundreds of cases of pre-frontal cortex injury that did not affect cognitive functioning but planning and social functioning have been recorded (Dimond, 1980; cited in Barkley, 2012). More recent support for the distinction between hot and cool executive function comes from a study which found that children's development of hot and cool executive function show different patterns of relation with each other (Hongwanishkul, Happaney, Lee, & Zelazo, 2005). In the same study, the hot-cool distinction was made even more evident when cool executive functioning, but not hot executive function was shown to be related to general intellectual functioning.

In summary, evidence points to a hot-cool distinction in executive functioning. It is timely that both performance-based and ecologically valid measures are used to index executive functions. When used in isolation, each measure provides a different and piecemeal representation of executive function. However, when used in unison, these two different underlying mental constructs of executive function measured by the two different measures work together to present a comprehensive and thorough understanding of executive function.

COOL IC AND LITERACY ACHIEVEMENT IN AT-RISK CHILDREN

Cool measures of executive function have been criticised for reducing the human brain to a passive computer system because they merely measure cognitive processing (Barkley, 2012). Despite that, cool measures of executive functions, including IC, are a good predictor of literacy outcomes in preschool children (Blair & Razza, 2007; McClelland et al., 2007) and even better predictor of mathematics outcomes (Willoughby, Kupersmidt, & Voegler-Lee, 2012). Common measures of cool IC in preschool children require children to inhibit their immediate and natural responses and instead, execute the experimenter's desired response. Examples include the Shape Stroop, Simon Says, Head Toes Knees Shoulders task (Carlson, 2005; McClelland et al., 2007).

There is general consensus amongst researchers that cool executive function is impaired in children with reading difficulty, compared to typically developing children (Helland & Asbjørnsen, 2000; Reiter, Tucha, & Lange, 2005; Van der Schoot et al., 2004). In another study that compared executive functions and literacy in typically developing and language delayed children, predictive ability between executive functions and literacy outcomes were weaker for the children with reading difficulty than those without reading difficulty (Altemeier, Abbott, & Berninger, 2008). The authors have suggested that this could have resulted from the inability of children with reading difficulty to apply their executive functions to reading and writing compared to typically developing children.

Executive functioning processes (including IC) referred to in the above study predicted literacy outcomes the most during the early school grades where basic reading skills were paramount but was relatively weak in predicting reading comprehension. The authors suggested that certain measures of executive function, such as IC, contributed more to lower level literacy skills such as decoding and word reading than higher level literacy skills such as reading comprehension and writing which can be better measured by executive function that taps on planning and organisation. Hence, the specific executive function process can moderate the relation between cool IC and literacy outcome.

The relation of cool IC and literacy outcome can also be moderated by the stage of literacy at which literacy outcome is measured. During the very early stage of reading when phonemic decoding of single words is important, inhibition is needed to suppress irrelevant codes during the phonological retrieval of sounds for letters in the word (Altemeier et al., 2008). At the later stage of reading which involves reading sentences in context, inhibition continues to be important because of word substitution tendencies in the less experienced readers. 'Impulsive reading style of guessers' need to suppress an immediate and misleading response to a word until all the letters in the word stimulus have been analysed (Van der Schoot et al., 2004, p. 173). Finally, while inhibition could possibly be important for reading comprehension because it limits potentially distracting and irrelevant information (Cain, 2006), a relatively weak ability or inability of inhibition to predict reading comprehension has been found in other studies (Altemeier et al., 2008; Christopher et al., 2012). However, these differences in findings could possibly be explained by the differences in comprehension text demands (Cutting et al., 2009).

In view of the above, it is increasingly apparent that the predictive relations between cool IC and literacy outcomes depends very much on the type of executive function that is being measured, as well as the specific literacy outcome that is being studied (Booth, Boyle, & Kelly, 2010; Foy & Mann, 2012).

HOT IC AND LITERACY ACHIEVEMENT IN AT-RISK CHILDREN

Hot executive function is known to be more complicated than cool executive function, because it involves both behavioural and emotional regulation (Zelazo & Carlson, 2012). Unlike cool executive function which has a longer history, the inclusion of hot executive function is relatively recent. Several executive function researchers (e.g. Barkley, 2012; Zelazo & Carlson, 2012) have recognised and advocated for the inclusion of hot executive function. Cool executive function processes can be seen as the cognitive capacity of the individual to reach the goal, but hot executive function provides the basis for choosing the goal in the first place and the motivation to get there. Hence, it is logical that the hot and cool executive function complement each other in goal attainment and must be considered together for a holistic view of executive function. While cool executive function is examined using abstract cognitive tasks without tapping on emotions or motivation, hot executive function is conventionally examined using affective tasks such as the 'marshmallow experiment' or any of its variation to measure delayed gratification, also known as IC (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Hongwanishkul et al., 2005; Willoughby, Kupersmidt, Voegler-Lee, & Bryant, 2011) .

'Delayed gratification' is the ability to postpone instant enjoyment for the sake of later but better outcomes. It has also been recognised as an enduring individual difference in self-control (Mischel et al., 1989). In the classic marshmallow experiment, delayed gratification has shown to be a good predictor of positive life outcomes (Mischel et al., 1989). When left alone with marshmallows in the room, two kinds of four-year-olds surfaced. Some resisted their urge to consume the marshmallows and waited so they could be rewarded, while some succumbed to instant gratification and were willing to forgo the reward. The gratification-delayers with more IC later developed into adolescents who have higher SAT scores, more socially competent, and cope better with stress, frustration and temptations. The ability to delay gratification and inhibit impulses is vital to their later development. Other longitudinal studies have also shown similar findings (Mischel, Shoda, & Peake, 1988).

Unfortunately, recent efforts to show the links between hot IC and academic achievements in non-longitudinal studies have been comparatively disappointing. In a one data-point study that examined the contributions of hot and cool executive function, including IC, to disruptive behaviour and academic achievement, only the cool executive function was uniquely related to children's performance on academic achievement tasks, including literacy tasks (Willoughby et al., 2011). In another one data-point study that studied few components of executive function, including IC, hot executive function also failed to predict achievement outcomes when examined together with cool executive function, but it managed to predict learning-related

behaviours when analysed separately from cool executive function (Brock et al., 2009).

There can be several reasons as to why performance on hot IC task is not linked to academic outcomes in those studies. First, the differences in contributions of hot IC might have to do with the time lapse between the point of assessment of hot IC and the point of assessment of academic achievements. Perhaps, the 'fruit' of hot IC has a longer 'gestational period'. After all, the good learning-related behaviours found related to hot IC in the study by Brock et al., (2009) and Denham et al., (2012), might take time to translate to real academic achievement outcomes. Good learning-related behaviours can produce academic results eventually. However, if measured too early, it might not show. Second, hot motivating tasks capture the child's optimal performance through while optimal performance is often not captured in academic outcome measures (Allan et al., 2014). The mismatch may have resulted in the inability of performance on hot IC tasks to predict academic achievement.

While individual differences in hot IC have been widely studied amongst young preschoolers below five, it has surprisingly been unstudied in older children, as well as in children with learning difficulties. Hot IC has been suggested to improve as a child gets older. A two-year-old exhibits much less self-control than a five-year-old (Hongwanishkul et al., 2005). Although the original or variation of the delay of gratification experiment (Mischel et al., 1989) has shown to be a popular measure of hot IC (Beck, Schaefer, Pang, & Carlson, 2011; Hongwanishkul et al., 2005; Razza & Raymond, 2013), many children reach ceiling levels on most available preschool executive function tasks by five years of age. In four year-olds, the passing rate of the hot-delay gratification task was a high seventy percent (Carlson, 2005). Using this task on six-year-olds participants (in the context of this study) will result in a ceiling effect, as well as a low variability of scores. An alternative to measure hot IC in older children is needed.

CONCLUSION

Given a lack of research examining inhibitory control in children with dyslexia using ***both*** performance-based and ecologically valid measures, pursuing research in this direction will richly enhance our current understanding of dyslexia and inhibitory control.

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Experiences of Dyslexic University Students in the UK

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In this article, I report the experiences of nine students who were identified as dyslexic in the UK and have mainly successfully completed an undergraduate degree. The article identifies some of the issues emerging for these students in relation to early assessment and support, with material extracted from informal interviews. The article makes interesting reading, confirming that even in the more able dyslexic who achieves university entrance, dyslexic problems are still uppermost in their thoughts, and continue to effect their self esteem and achievement. The implications for support for dyslexia are discussed.

ASSESSMENT OF DYSLEXIA

There are clear individual differences in when the students were originally assessed, and this impacts on their educational performance and self-esteem, with some identified and supported as children and others more recently.

Three students were assessed for dyslexia in primary school. Adam had difficulty with reading and it was suggested by his Head teacher that he might be autistic. Harry had problems with English and was assessed with dyslexia and dyscalculia and George was easily distracted, clumsy and, had difficulty with fine motor control; George thought the Educational Psychologist was not interested in him, but spoke to his parents saying that George's difficulties would pass and gave

"...the more able dyslexic who achieves university entrance, dyslexic problems are still uppermost in their thoughts, and continue to effect their self esteem and achievement."

an assessment of having cross-lateral difficulties. In secondary school his dyslexia teacher said that he was more dyspraxic than dyslexic but he was never formally assessed with dyspraxia. At College more of his problems were identified, most notably the difference between his Verbal and Performance IQ and a couple of teachers sorted him out. Harry was subsequently tested throughout his schooling.

Two students were assessed at secondary school: Bridget went through the process of assessment twice but was given a negative result and Ian was not initially assessed with dyslexia but with a SpLD due to increased pressure on the brain possibly due to an hormonal imbalance. At college Bridget was given a 4 hour computer based test and was given a positive assessment of dyslexia. Six students (including Bridget) were assessed at university:

Charlotte had difficulty with reading and writing at primary school and according to her, "her Headmistress thought she was thick". In Middle School she was tested for aural and visual difficulties but not till she was in university was she tested for dyslexia; Edmund always had problems with English, spelling and achieving a flowing written argument at School but only in the second year of university did anyone (in this case a lecturer) suggest he might have dyslexia.

Fiona was assessed in her final year at university and chose to suspend that year and re-take the final year but subsequently (a few weeks after her interview with the researcher) she chose to withdraw. The Educational Psychologist who assessed her said she had probably got so far with intellect rather than remembering basic facts.

Daniel was assessed at university because his Mother started a postgraduate course as professional development and dyslexia was part of a module and she recognised that her son had similar difficulties. Adam was assessed in the second year of his university course because he decided not to disclose his dyslexia and as LEAs require a recent assessment, he had to pay for one. The Educational Psychologist stated that his dyslexia prevented him from attaining his true potential.

Ian had learned to read at an early age and read quite a lot but by about 11-12 years he had difficulty reading. He was developing severe headaches and had to undergo medical tests which indicated that the headaches were related to his writing by hand and he was given a laptop and taught to touch-type. He also developed extreme tiredness due to a malfunction of his pituitary gland, which allowed fluid to build up on his brain which was relieved by a lumbar puncture. There was a history of headaches at puberty in his father's family. Ian was recognised as having a learning difficulty, which was not classified and it was only at university that Ian was assessed as having dyslexia.

It may be seen from the data on time of diagnosis that a number of the students show issues of co-morbidity, which have made their original diagnosis more complex. On the other hand, outcomes and self esteem seems higher in those supported in primary school.

FAMILY HISTORY

There is evidence that family history is an important risk factor for dyslexia, with around 50% incidence for those with a family history. If parents have experience of difficulties themselves, this may facilitate the development of the child, or they may deny their difficulties and make life more complicated for their children. So it is important to establish how these students fare on this criterion, and whether this has impacted on their outcomes.

Charlotte said her parents and brother have signs of dyslexia but no one has been formally tested.

Edmund said that possibly his Mother may have dyslexia but she was not academic nor was anyone else in the family and it has not been picked up in anyone.

Fiona said that her Mother was really good at spelling and spots her and her sister's mistakes. Her Mother was baffled by her daughter's inability to read and spell.

George had two cousins who were suspected of dyslexia and another relative on his father's side who has dyslexia, and a half brother on his Mother's side also has a mild SpLD.

Ian said his mother finds reading numbers difficult but she is a computer programmer and very maths literate.

Clearly, from the information here, we can see that life is more difficult for those such as Fiona, whose mother is not necessarily sympathetic to her difficulties, but can easily spot her mistakes.

SCHOOL EXPERIENCE

One of the most important issues identified in research is the importance of the age at which children are diagnosed and whether or not they are given effective support. Particularly significant is the attitude of parents and schools towards the difficulties that children experience, and this can be key to their self esteem.

Again there are individual differences in experience from the student responses.

Daniel remembered reading a book at primary school. His spelling was bad and there was a designated dyslexia teacher at the school. And he used mnemonics for spelling at age 11.

George was not keen on drawing at primary school and said that he had a lazy hand but he found it difficult to learn with 27 other pupils. He was sent to a hospital when he was about 10 years old and "treated for clumsiness" by walking straight lines and doing ball exercises. Subsequently he did a lot of sport and has no problem catching a ball now.

Daniel was good at Maths and English at primary school. At Grammar school he was mixed academically, maths and science were good and English was all right but languages..."I hated languages vehemently". Daniel lived in France for 3 years and could speak some French but forgot it. He got an A and B in GCSE but he did not enjoy it. He did not like trying to define the words – nouns, verbs –that language is built on. He worked specifically on spelling but his handwriting is much worse. In the Sixth Form science coursework assessment was easier but exams were "hit and miss".

Edmund was bad at spelling at primary and secondary school, which his teachers put down to laziness but he did not think he was lazy. His comprehensive school had 2000 pupils and there was not an expectation for all to get an A* - if people trundled along teachers were happy. During his A level studies laziness was inferred – a teacher said that he should be more careful with his use of language – but there is a difference between being careful and needing help.

Fiona said with sarcasm that she had a "really nice" primary school. Pupils were taught if they were clever but if not, you were ignored. She could not remember learning to read and write; it was too long ago. Her teacher said she was too stupid to sit the +11 and told her Mother that she was not clever enough, but she thought she was clever enough to pass except for spelling. She could only remember reading one book of "the cat sat on the mat" kind. Her secondary school was in a poor area and most of the pupils were disruptive, although she was in a group that wanted to learn. This school failed its Offsted and so did the Sixth Form. She feels that she left a trail of bad education behind and it was hard to learn. So her dyslexia was not picked up. As regards spelling –she enjoyed doing the tests – she could learn words but then forget them 10 mins later. She misbehaved at primary school ("a terror") but also sneaked a look at her next-door neighbour's work who was a genius.

Harry sat the 12+, though he knew he would not pass. He thought his parents put him in for the experience so that he would have a better chance of passing the Common Entrance Examinations. They thought a state school would be no good as he might be at the bottom of a big class. He got in to private school. They wanted him to go into year 8 but the Headmaster said come back into year 9. He did that and went back for Senior School. Sixth Form – no complaints. Had a gap year as a teaching assistant and if children asked for spellings (which he found embarrassing) he pointed to the dictionary.

At primary school Bridget found spelling difficult and presentations (she slurred her words). There was very little help at primary school and she was told that she was lazy, although on the whole she enjoyed primary school. Bridget and her Grandfather knew she was dyslexic but writing to school etc made no difference because of targets and target setting. Bridget struggled and got along but with help could have realised her potential. Bridget had a major illness halfway through and based on her GCSE results, the Headmaster said "You will never make a degree". As her GCSE grades were not good enough she had to fight to get on an A level course. At a school evening her Mother and Grandfather had to fight to get her on A level History and A Level Religious Studies. During A level exams her Grandfather died and her teacher wrote to the A level Board about this and she was awarded a B, C and D which gave her confidence.

At College Bridget took A Level German and A Level Travel and Tourism. She was the oldest in the class but consistently passed exams and passed them well. She was top of the class and also Student Union President and on the academic board disciplinary panel. Her reading improved greatly, although her handwriting was atrocious. History and Geography was her "bag". She won the atlas quiz and "hoovered" up all new knowledge. She tended to be mid-range but knew she was more than that but she just had to hang in there. At primary, secondary school and college it was a battle to get any help.

George was not that needy so his parents put him into private education and he did really well in his GCSEs. The state school knew he would pass 5 GCSEs so they had to send resources to other more needy pupils. However, in private school everyone bent over backwards to help the pupils. At college it was 50:50. It took time to learn the system and how to get the help.

After the age of 12 Ian was tutored at home and then a pupil referral unit, but he found High School very helpful and found that staff were willing to be understanding. It can be seen from these comments that the experience of the students is highly varied, ranging from those who were protected and supported to those who felt ignored and disregarded. Again there is clear evidence here of co-morbidity from

many of the students, and evidence that the breadth of their difficulties was a puzzle for those trying to identify their needs.

INTERVENTION

A key issue is the type of support children received, and the experiences of the students is again very variable here. Those with a firm diagnosis of dyslexia have received support, but others have been treated as low achievers throughout their school careers.

Adam spent time at a special day-care centre (at primary school age) for children with learning difficulties. He had lessons outside class, possibly once a day (1 or 1.5 hours) on writing and spelling, and he also had elocution lessons, mainly one -to one at first. Throughout primary school and middle school he had some extra sessions, mainly small group sessions. He also had his reading recorded and then had it played back. Adam did not have as much help in High School as in Primary School. He also had someone to take Science lesson notes and some notes in English classes but Adam said he wanted to take his own notes so as to be independent which on reflection was not a good idea. He studied quite a bit especially for English. He got D for English Literature and C for English Language. At Sixth Form he had an interview and was offered help. They suggested a laptop but Adam said no as his typing was slow. A special room for the use of voice recognition software was available, but Adam's voice was not clear enough so he thought it would be slow and he did not use it.

As Bridget was not assessed as dyslexic at school, she received no help. She was put in the lowest set for English and had to fight to get put into the next set. There was no help to understand the issues around dyslexia. At her school pupils with physical disabilities were put in a different wing of the school and not integrated. As Bridget was not positively assessed for dyslexia, this meant that Bridget was more integrated into the whole school. Three of her school-teachers took Bridget under their wings and at lunchtime and break times they would ask her how things were going. These teachers were open to other pupils because some teachers are more pupil-friendly. One of these teachers looked at one essay and then helped Bridget and she got a good result, which spurred her on. Also she now had a formula about how to write an essay so on the next assignment she doubled her mark and she believed that she would not be at university today without that help. Bridget was given a lot of help with spelling at college and she was able to use her own resources – teaching herself.

Only at university did she receive 'proper' help in terms of English (grammar and

punctuation), presentation skills, confidence and reduction of stress through relaxation exercises and techniques. Bridget does not like group work because it is too impersonal. However, with one-to-one tuition the tutor got to know her and how she worked. The student can set the agenda but she is unsure and reserved in a group. One can say what one feels in an individual session and not feel embarrassed or ridiculed.

Charlotte had good help at Middle School (aged 9 – 11). She was in a group with 3 other students. Her teachers suggested she should be taken out of Mathematics and not English. She was given some reading techniques and told the difference between, for example, could, should and would. Charlotte missed some mathematics lessons, for example, fractions and was never good at them and never caught up because as one progresses one does not go over the hard stuff - just the harder stuff. In her next school (Year 4, 5 or 6, at age 11) Charlotte had no help because a lot of the pupils in the school had learning difficulties. The school was in a poor area with lots of pupils and she was in the top set for all subjects, but just not as good at English as Mathematics. She was average at English. She did not study History but studied art instead.

Fiona only had help with Mathematics.

At primary school George had an external teacher who helped with word searches. Every one or two weeks he was taken out of a class 30 minutes before the end and took half of the lunch hour to go into a small group of 6 students. This was helpful but embarrassing because he was doing something different to the rest of the class. George went to a state school for one year and the only help they had to offer was a laptop. He was then moved to a private school and had one-to-one tuition for the first 2 years (2 or 3 times a week). They had their own tests- IQ etc but his reading and spelling age went up by 4 yrs at private school. He went to a technical college to study for A levels. He was given extra English for comprehension and his chemistry teacher was very helpful with mathematics and chemistry. He had one-to-one dyslexia tuition, which helped with confidence as they would proofread work because he sees only what he thinks he has written.

After his assessment, for dyslexia Harry had lessons outside of school to help with literacy and also the lessons he missed. Also he had 45 minute touch typing lessons during the lunch break but had no extra tuition at Senior School but found the house System in his Senior School supported him and his Head of House whilst not an academic office did monitor his progress so that he was pushed but also supported. Harry had extra lessons all the way from 7 – 13 years old.

Ian was given a laptop.

EXTRA TIME IN EXAMINATIONS

In order to achieve their potential, it is important that dyslexic children are allotted the extra time which they are due in public exams, in many Western countries and also in Singapore.

Ian had 25% extra time in examinations for GCSEs and A levels because he became very tired in examinations and sometimes fell asleep in the examination. However, his inability to write quickly prevented him from finishing his A Level Mathematics paper even though he knew the answers and so he felt that extra time was justified in his case.

Harry also had extra time in public examinations and he felt he could not have done without it as he only just managed to finish papers with the extra time. In his case he needed extra time in order to read the questions. He often had to re-read texts to comprehend what was asked of him and to analyse the questions. Harry observed that in the case of English papers he was still reading when everyone else had begun writing.

Bridget received extra time in examinations at College once she had a Dyslexia Assessment. In Bridget's case, the extra time alleviated her stress and allowed her to 'refresh her brain and re-focus'. .

George was given extra time for As2 level examinations whereas Adam and Charlotte only had extra time in examinations, as did all the students who were interviewed, at university level. Adam said that the extra time in examinations allowed him to read the question through properly, to write more clearly and proof read some of his answers.

MATHEMATICS

A number of students with dyslexia experience difficulty with maths, whether with concepts or the wording of problems. This overlap is often overlooked, so it is interesting to check on the experience in this group.

Adam thought he was 'OK' at mathematics but he was not good at graphs and shapes but all right with algebra. He passed with a B grade for GCSE. Bridget, on the contrary, said with regard to Mathematics that she was "useless, pathetic". She could add, subtract, multiply and divide using a

"A number of students with dyslexia experience difficulty with maths, whether with concepts or the wording of problems."

calculator but not in her head and has never been able to learn her tables. Bridget does not avoid mathematics but if she had to tackle algebraic equations she would feel very stressed and pressured.

Daniel enjoyed Mathematics – coloured textbooks were filled in and he could see his daily progress but he had to re-sit his examinations to get a C or B in GCSE. His mathematics tutor was brilliant could explain things just right but he could not understand his mathematics teacher. At Grammar school his Mathematics and Science were good and at Sixth Form Physics, Biology, Geography and Philosophy coursework assessment was easier although exams were "hit and miss".

Fiona also could not learn her tables and had extra help with mathematics after she was awarded a D for her GCSE. After two mathematics lessons a week from a "brilliant" mathematics teacher she re-sat her examination.

Harry was assessed as having dyscalculia and had extra mathematics lessons in primary school.

Ian was very good at Mathematics although he was slow at reading the actual questions. He is not quick at reading and understanding Mathematics questions. He has a difficulty copying lines of Mathematics; he can miss a minus or something. So he has to check his work a great deal. Ian is unable to hold an image in his head because of a short-term memory problem. He needs to write a Mathematics problem out and then look at it. He needs to write out every little step of the solution. Ian enjoys Mathematics; it takes lots of thought but it is good for his Science subject.

UNOFFICIAL HELP

At University Daniel found it difficult to get low-level help. He tried to contact people during his second year exams and no one was available. He also said that a dyslexic friend was constrained by course.

Fiona said that her Mother and Grandparents tried to teach her to read and write when she was at pre-school. Also, her Aunt was a library teacher and tried to encourage her to go to special reading classes but Fiona hated books. Eventually her Mother read books to her because her mother wanted Fiona to be like Fiona's friend who was "a genius". Even now Fiona only reads the first 4 pages of a book and then just puts it on her shelf.

It can be seen from the interviews that there is considerable variability in maths in

this group, ranging from the most extreme, to some who are even quite strong in this subject.

EMOTIONAL REPERCUSSIONS

Interestingly, there will also be considerable heterogeneity in the emotional responses of the students. Some feel stigmatised if they are receiving 'special' help, while others accept that they are stupid, or react by acting the clown to distract attention from their learning difficulties. Nevertheless, most dyslexics suffer emotional repercussions of some kind and these depend on the individual temperament as well as the environment in which they find themselves.

Adam was not happy at being at being taken out of class. At the time he felt alienated and had a desire to be independent although he thinks that response is silly now. He also felt very embarrassed at having his reading recorded and played back to the class but he now feels at ease about reading aloud.

Bridget believes that her personality saw her through. If she had been given help earlier in her education, she could have been awarded a 2i or a first. She felt a failure up to that point but when she was shown how to write an essay at age 14/15 she decided that she would prove her Headmaster wrong.

Edmund experienced a certain relief at knowing that he had dyslexia as he said, "it was good to know what a problem is so you can work on it". He felt the assessment tests were childish, and that it was difficult to explain to his parents that he might be dyslexic. He also felt that there was a stigma about having dyslexia at university as "you're supposed to be intelligent". Edmund obviously felt that others at the university might equate dyslexia with being unintelligent. Edmund said it was a challenge to cope with it when you are at university; actually being told at 20 years old that you are dyslexic; it was quite a shock to the system. It was nice working in the dyslexia group because you did not feel quite so isolated. At first I thought I was the only person with this, so it was good working in a group because other people asked questions and chipped in. If I had been assessed at age 10, I might have developed better ways of coping with it.

George did not have enough confidence because he been knocked back many times in primary school when teachers thought he was lazy. In secondary school they worked on targets and he was told that he would fall below the target so they could not help him. His parents were outraged so they moved George to another school.

Harry reported that his Mum said he used to get very frustrated because he could not do things, but he does not remember this. He was a very happy kid and was used to being able to do things but at some point he found he could not do certain things. Then he was put into a very good preparatory school who worked on his strengths – sport and art- and he was encouraged. He had problems with English but he was all right. Sometimes he worked really hard but got a bad mark. His parents said he had done the work and his teachers were usually willing to explain it and he got feedback from them.

Ian was very stressed when trying to keep up with copying down work off the board especially when he had to keep asking for work to be left for a longer time on the board.

So each individual here reacts very differently to their situation, as we would predict from the literature.

CONCLUSIONS

It may be seen that the experiences of these nine students have been very different, but a number of key factors emerge. Those students who were not assessed in school felt that they could have achieved more with the benefit of early support. It is interesting to note, that for several of these students their dyslexic problems were overlooked because of attendant physical issues. It is important to remember that experience in school changes over the year, depending on the knowledge of dyslexia within the education system. For these students, there would have been a reasonable awareness of dyslexia and it's problems. Nevertheless, Fiona in particular seems to have been damaged by lack of recognition of her difficulties by her family and school, and this may have impacted on her decision to withdraw in her final year without completing her degree.

Recent changes in the support system in the UK from September 2016 will mean that there is less availability of support for students with dyslexia. Nevertheless, there should be a keen awareness in staff of the impact of dyslexia in the student age range. In countries where awareness of adult dyslexic problems is not as well developed, it is likely that problems would be exacerbated by failure to understand the lifetime effects of dyslexia. It is important that these are recognised and addressed across the world.

ABOUT THE AUTHOR

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Dr Margaret Meehan has a PhD in chemistry and is the coordinator of specialist tuition for the Academic success programme at Swansea University. Margaret is co-author with Barbara Pavey of Dyslexia Friendly Further and Higher Education and Dyslexia friendly toolkit.

Dr Margaret Meehan has worked with adults with Specific Learning Difficulties in Higher Education for over 15 years. Initially supporting dyslexic students who experienced difficulties with mathematics and science, she delivers specialist tuition to students across all disciplines. She was a researcher on an award winning Tempus Project on the Identification and Support in Higher Education of Dyslexic Students (ISHEDS) in the Balkan countries and Wales, and has carried out small research projects on Dyslexia and the Experience of Students in Higher Education; Dyspraxia, Dyscalculia and Mathematics; Dyslexia and Entrepreneurship; and Dyslexia, Welsh and Bilingualism. The co-author of Dyslexia Friendly Further and Higher Education (Sage, 2010). Margaret has also delivered Dyslexia Awareness Training to Universities, Local Authorities and private companies. Margaret's main areas of expertise are:
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